

Understanding the role of Clock Towers in shaping Urban Identity and Perception of Urban Space

Case of Chimnabai Clock Tower, Raopura, Vadodara

Bachelor of Architecture Research Thesis

June 2024

Submitted By

Samruddhi Vyas

19BAR089

Guided By: Professor Jitendra Menghani



Institute of Architecture & Planning,

Nirma University

Ahmedabad, 382481

Institute of Architecture & Planning, Nirma University

Approval

The following study is hereby approved as a creditable work on the subject carried out and presented in the manner, sufficiently satisfactory to warrant its acceptance as a pre-requisite towards the degree of Bachelor of Architecture for which it has been submitted.

It is to be understood that by this approval, the undersigned does not endorse or approve the statements made, opinions expressed or conclusion drawn therein, but approves the study only for the purpose for which it has been submitted and satisfies him/her to the requirements laid down in the academic program.

**Thesis Title : Understanding the role of Clock Towers in shaping Urban Identity and Perception of Urban Space: A Morphological Perspective
Case of Chinnabai Clock Tower, Raopura, Vadodara**

Student Name : Samruddhi Vyas

Roll Number : 19BAR089

Date : 24th May 2024

Prof. **Jitendra Menghani**

Guide & **Assistant Professor**

Institute of Architecture & Planning, Nirma University, Ahmedabad

Prof. Utpal Sharma

Director,

Institute of Architecture & Planning, Nirma University, Ahmedabad

Declaration

I, **Samruddhi Vyas, 19BAR089**, give an undertaking that this research thesis entitled **“Understanding the role of Clock Towers in shaping Urban Identity and Perception of Urban Space: A Morphological Perspective ; Case of Chinnabai Clock Tower, Raopura, Vadodara”** submitted by me, towards partial fulfilment for the Degree of Bachelor of Architecture at Institute of Architecture and Planning, Nirma University, Ahmedabad, contains no material that has been submitted or awarded for any degree or diploma in any university/school/institution to the best of my knowledge.

It is a primary work carried out by me and I give assurance that no attempt of plagiarism has been made. It contains no material that is previously published or written, except where reference has been made. I understand that in the event of any similarity found subsequently with any published work or any dissertation work elsewhere; I would be responsible.

This research thesis includes findings based on literature review, study of existing scientific papers, other research works, expert interviews, documentation, surveys, discussions and my own interpretations.

Date: 24th May, 2024

Name : **Samruddhi Vyas**

Roll number : **19BAR089**

Institute of Architecture and Planning,
Nirma University, Ahmedabad

Format for Thesis Samruddhi Vyas

ORIGINALITY REPORT

7%

SIMILARITY INDEX

6%

INTERNET SOURCES

1%

PUBLICATIONS

3%

STUDENT PAPERS

PRIMARY SOURCES

1

en.wikipedia.org

Internet Source

2%

2

diva-portal.org

Internet Source

1%

3

silo.pub

Internet Source

1%

4

huggingface.co

Internet Source

1%

5

historyofvadodara.in

Internet Source

<1%

6

Submitted to Wageningen University

Student Paper

<1%

7

Submitted to University of Salford

Student Paper

<1%

8

5dok.net

Internet Source

<1%

9

ueaeprints.uea.ac.uk

Internet Source

<1%

10	Submitted to University of Alabama Student Paper	<1 %
11	www.slideshare.net Internet Source	<1 %
12	corneille.eu Internet Source	<1 %
13	Lauretta Rubini, Chiara Pollio, Marco Di Tommaso. "Transnational Research Networks in Chinese Scientific Production. An Investigation on Health-Industry Related Sectors", International Journal of Environmental Research and Public Health, 2017 Publication	<1 %
14	etd.lib.metu.edu.tr Internet Source	<1 %
15	www.coursehero.com Internet Source	<1 %
16	Fahri Celik, Ibrahim Erturk, Eda Turan. "Investigation of main particulars subject to minimum building cost for chemical tankers", Ocean Engineering, 2013 Publication	<1 %
17	www.grossarchive.com Internet Source	<1 %

Submitted to Middle East Technical University

18

Student Paper

<1 %

19

www.ijert.org
Internet Source

<1 %

Exclude quotes On

Exclude matches Off

Exclude bibliography On

Contents

1. Introduction

- 1.1. Significance of study and Background
- 1.2. Aim
- 1.3. Objectives
- 1.4. Research Questions
- 1.5. Scope and Limitations
- 1.6. Research Methodology

2. Literature Review

- 2.1 Edward Relph's Elements of Identity
- 2.2 Kevin Lynch's Legibility
- 2.3 Montgomery's Sense of Place

3 Framework of the study

- 3.1 Theoretical Framework
- 3.2 Investigation Methods
 - 3.2.1 Methods used earlier to study identity, morphology and perception
 - 3.2.2 Data Collection Methods
 - 3.2.3 Method of Investigation

4 Secondary Case Studies

- 4.1 Comparative Matrix of 15 Clock Towers
- 4.2 Selection of Case Study

5 Primary Case Study

- 5.1 Raopura Clock Tower, Vadodara

6.Conclusion

- 6.1 Analysis
- 6.2 Conclusion
- 6.3 Inferences

1.1 Significance of study

Clock towers are prominent Urban Landmarks that often carry historical significance and cultural value. They have become symbols of civic pride, anchors for navigation, and focal points for communal activities. Examining how these structures influence Urban identity can reveal how physical landmarks contribute to the collective memory and identity of a city's inhabitants, reflecting broader social and cultural dynamics.

The study explores how the unique historical and social context of each city shapes the impact of morphological transformations on the perception of their clock towers. This, in turn, enriches our understanding of the context of Vadodara.

Urbanization can have a big impact on a city's social, economic, and cultural structure. By understanding how transformations of urban form affect those who live there, urban planners can make informed decisions that balance development with preserving the city's unique character and sense of place. It can aid in understanding how to promote a feeling of community, build more inclusive neighbourhoods, and improve the overall city's public image.

Background

Clock towers are a specific type of structure which house a turret clock and have one or more clock faces on the upper exterior walls, which is often visible from a distance. These towers are usually found on public buildings, such as churches, town halls, or other significant municipal buildings.



They serve both a practical purpose, providing the time to the public, and an aesthetic one, often becoming landmarks in their own right. Some clock towers also feature bells that chime at regular intervals, marking the passage of time audibly as well as visually.

Many clock towers are freestanding structures but they can also adjoin or be located on top of another building.

Based on their morphological context, they can be identified into the following categories:

Figure 1. Big Ben, London (Source: <https://en.wikipedia.org/>)

1. Clock Tower placed in a Open Space/ Parks/Gardens.

Examples:

1. Secunderabad clock tower
2. Husainabad clock tower
3. The Campanile of St. Mark's Basilica, Venice, Italy

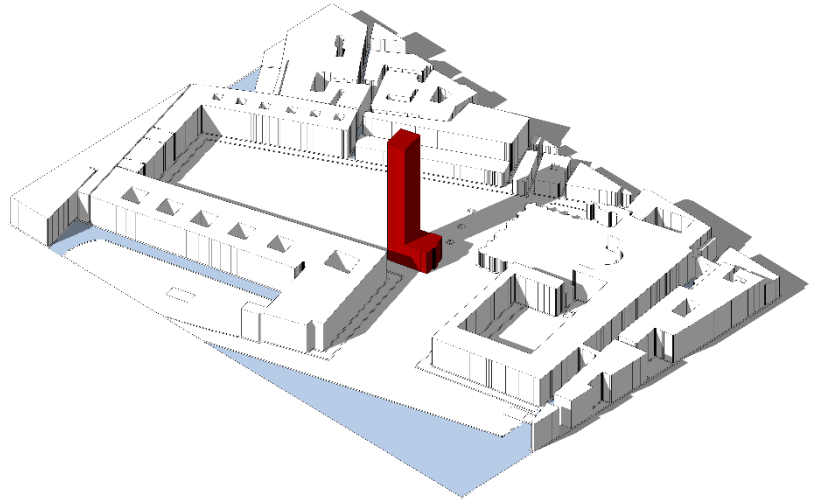


Figure 2. 3D contextual model of St Mark's Campanile (Source: Author)

2. Clock Tower as a part of a Building:

Examples:

1. Rajabai clock tower
2. Mahatma Gandhi hall clock tower, Indore
3. Big Ben at the Palace of Westminster, London, UK.

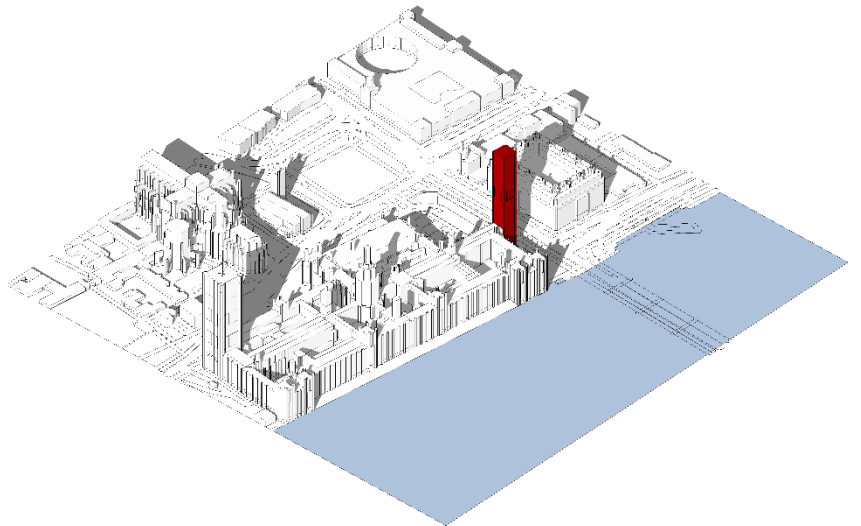


Figure 3. 3D contextual model of Big Ben, London (Source:Author)

3. Clock Tower in center of Plazas/ Chawks:

1. The clock tower at Lal chowk Srinagar
2. Ghanta Ghar jodhpur
3. The Clock Tower in the Market Square, Krakow, Poland.

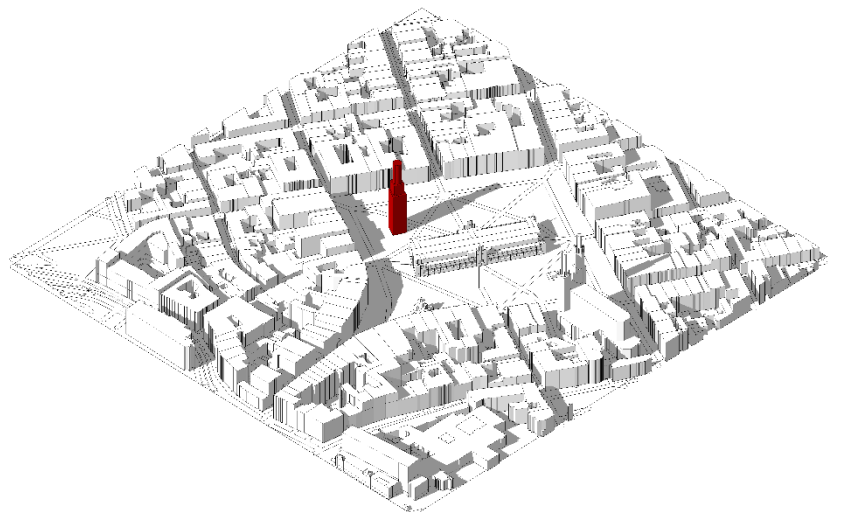


Figure 4. 3D contextual model of The Clock Tower in the Market Square, Krakow (Source: Author)

4. Clock Tower as Part of a Crossroads/Islands:

1. Dehradun Clock tower
2. Sayaji clock tower, Vadodara
3. Jaffa Clock tower. Israel.

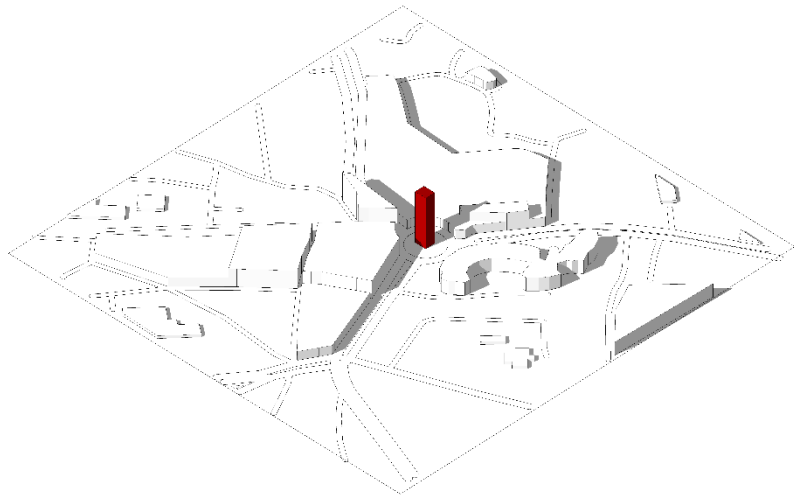


Figure 5. 3D contextual model of Dehradun Clock tower (Source: Author)

5. Clock Tower as a part of a Street Edge:

1. The Maharani Chimnabai Tower or commonly known as Raopura Tower in Vadodara.
2. Siddhpur clock tower
3. Estcourt clock tower, Gujranwala, Pakistan

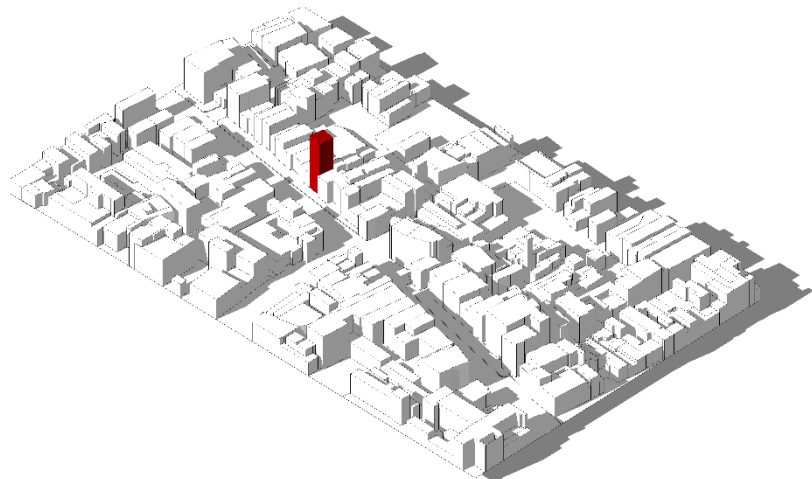


Figure 6. 3D contextual model of Raopura Tower, Vadodara (Source: Author)

Origins:

- They have ancient **origins in the West**, later spreading worldwide, symbolizing prestige in **European cities** during the 14th and 15th centuries.
- British rule in the 19th century brought the concept to the Indian Subcontinent, where clock towers became symbols of **timekeeping, punctuality, and landmarks in city centers**.

Today, these historic landmarks have evolved into **iconic images** of their respective cities, embodying their history, culture, and civic pride while some have lost its significance.

Purpose of Clock Towers:

- Before the middle of the twentieth century, most people did not have watches, and prior to the 18th century even home clocks were rare. The first clocks did not have faces, but were solely striking clocks, which sounded **bells** to call the surrounding community to work or to prayer. They were therefore placed in towers so the bells would be **audible** for a long distance.

- Clock towers were placed near the **centers of towns** and were often the tallest structures serving as **cognitive anchors** in Urban Space.
- Tower clocks also serve as a reference point for **navigation, orientation** and **way finding**.
- They also have cultural and social significance, serving as a symbol of **community identity** and **heritage**.

Most of the clock towers have not survived with passing time and have **lost their relevance**. The reasons being:

- Time keeping is no longer an important concept to most people.
- The Towers are not visible or noticeable due to extensive development around them.
- The maintenance of clock towers is poor and some are in really bad shape.

1.2 Aim

To investigate how Clock Towers as landmarks in Urban Space shape people's Perception and influence the Urban identity of the old city precinct of Vadodara.

1.3 Objectives

- To understand the meaning of Urban Identity and Landmarks and its impact on people's perception and social life through Literature review.
- To conduct a morphological analysis of the surrounding urban fabric of Raopura Clock Tower tracing their form and structure.
- To assess how changes in morphology have impacted the public perception of the Clock towers as Landmarks through surveys or interviews with residents of Vadodara.
- To evaluate the urban space on the basis of "identity" and "feeling of attachment"

1.4 Research Question

How have morphological transformations around clock towers lead to loss of identity and feeling of attachment inside a city?

1.5 Scope and Limitations:

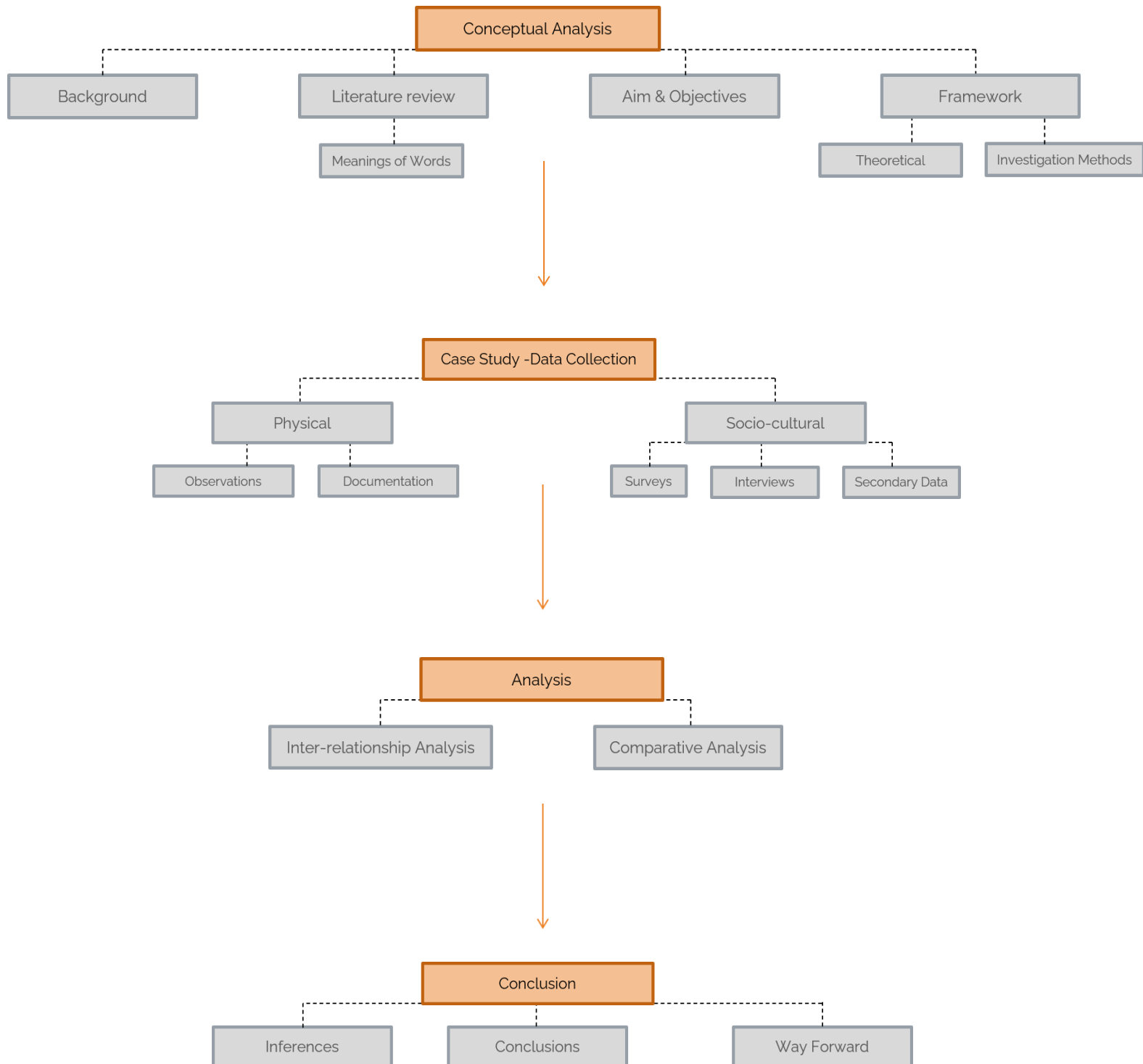
Scope:

- **Historical Significance:** Analysis of the historical context in which the clock towers were built and their architectural features.
- **Social Interaction Spaces:** Examination of the social dynamics around clock towers, including their use as meeting points, landmarks, and centers of activities.
- **Public Perception and Use:** Surveying or interviewing local residents and visitors to gauge the significance of clock towers in their daily lives and collective memory.

Limitations:

- **Geographical Limitation:** The study is limited to only one in India in detail, which may not represent the broader diversity of urban experiences.
- **Data Availability:** Difficulties in obtaining historical records or contemporary data regarding the construction, maintenance, and public usage of clock towers.
- **Subjectivity:** The assessment of cultural and social impact is inherently subjective and may vary significantly among different demographic groups.

1.6 Research Methodology:



2 Literature Review:

2.1 Edward Relph's Elements of Identity

(Relph, 1976) refers Identity as "persistent sameness and unity which allows that place to be differentiated from others".



Figure 7. Elements of Identity (Source: (Relph, 1976)

Relph in his book *Place and Placelessness*, says that the basic elements of identity are:

- the static physical setting,
- the activities, situation & events
- meanings

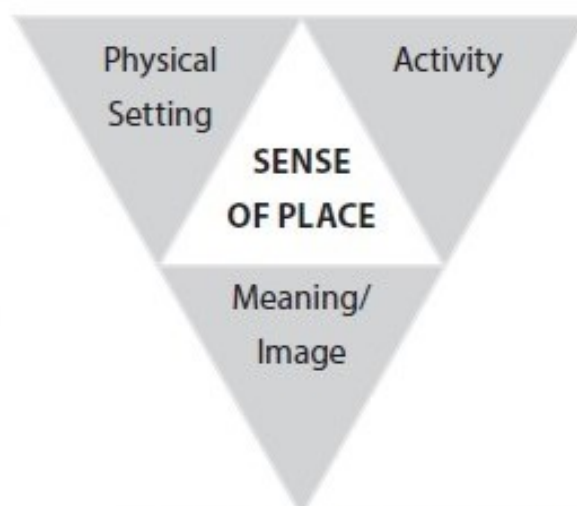


Figure 8. (Montgomery, 1998)

The first simply means the **physical state** of the place, spatial layout and morphology, second means the **dynamic things** happening in the physical settings like activities going on at that place. Third is the meanings of places that may be rooted in the physical setting and objects and activities, but they are not a property of them-rather they are a property of **human intentions and experiences**.

Meaning is far more intricate than this since intentionality is also a very complicated phenomenon that involves both individual and cultural variances that reflect unique interests, experiences, and opinions. All these components are interrelated, and their amalgamation creates identity of that place (Relph, 1976).

(Relph, 1976) also argues that despite being less concrete than these elements and dialectics, there is another significant part or aspect of identity that links and supports the others. This is the aspect of identity known as the "spirit of place," "sense of place," or "genius of place" (genius loci).

Both the unique individual and the culture to which they belong serve as the foundation for identity. It is not constant and unalterable; rather, it changes as circumstances and attitudes do. It is also not uniform and undifferentiated; rather, it has a variety of parts and shapes. (Relph, 1976).

2.2 Montgomery's Sense of Place

Montgomery's framework for understanding the components of place is centered around three core elements: activity, form, and meaning. These components interact to create a sense of place that is vibrant, functional, and significant to people.

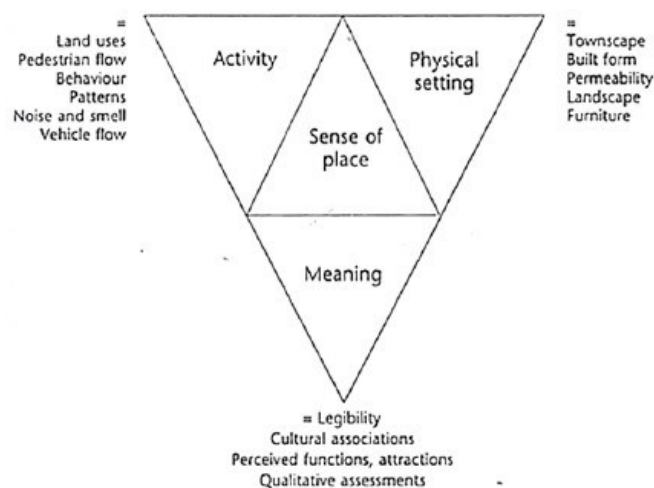


Figure 1. Diagram of Sense of Place by Punter and Montgomery. Source: Carmona, 2006, p. 99.

1. Activity

Activity refers to the social and economic functions that occur within a place.

2. Form

Form pertains to the physical and spatial characteristics of a place.

3. Meaning

Meaning involves the symbolic and emotional significance of a place to individuals and communities. This includes:

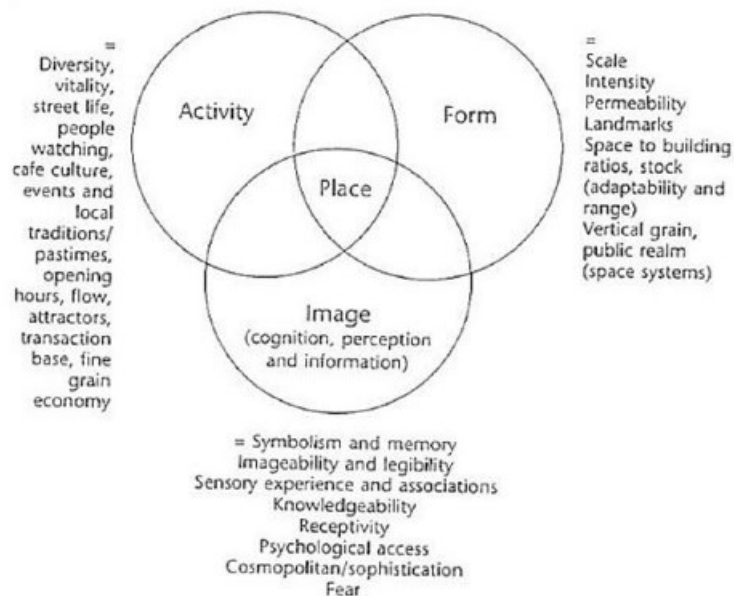


Figure 2. The Components of Place. Source: Montgomery, 1998.

2.3 Kevin Lynch's Legibility

Kevin Lynch, in his seminal work "The Image of the City" (1960), described landmarks as "physical reference points that aid in wayfinding and navigation within the urban environment."

He emphasized the role of landmarks in creating a mental map of the city and providing visual cues for orientation. Lynch highlighted the significance of landmarks in shaping **people's perception** and **experience** of the urban landscape. He stated:

"A good image of the city is one that has strong, identifiable landmarks and nodes, which serve as **reference points** for **orientation** and **navigation** within the urban environment."

Lynch's concept of "legibility" in urban design underscores the importance of **landmarks** in enhancing the readability and comprehensibility of the built environment.



Figure 9 Source: "Image of the City" by Kevin Lynch

3 Framework

3.1 Theoretical Framework

Based on the Literature review and pilot study, A theoretical framework was derived which constitutes three major components of Urban Identity-

- 1 Physical Setting
- 2 Activity
- 3 Meaning

Component	Attributes	Method for Investigation
1. Physical Setting	A) Urban Fabric	
	i. Surrounding context	Overall context and Connectivity
	ii. Vistas of Landmark	Views of the Landmark
	iii) Spatial perception	Visibility Map of Landmark
	B) Built form	
	i. Built Vs Open	Existing Footprint of built to be mapped (before and after)
	ii. Building Use	Usage of Buildings in selected Sample (before and after)
	C) Streets	
	i. Street Network/ Accessibility	Layout and hierarchy of streets
	ii. Facades	Architectural Style around landmark, visual continuity, overall composition
	iii. Nodes	Location of Important nodes in street network
	D) Scale	Proportional comparison with human
	E) Landmark	Location of Important Landmarks
	F) Space to building ratios	By Photographs
2. Activity		
	A) Street Life	
	i) Activity mapping	
	ii) Public life	
	B) People Watching	Observing peoples engagement with the tower
3. Meanings	D) Events	Events which include the tower association
	A) Legibility	
	B) Symbolism	
	C) Memory	
	D) Sensory Experience	
	E) Knowledgeability	

4 Secondary Case Studies

4.1 Comparative Matrix of 15 Clock Towers

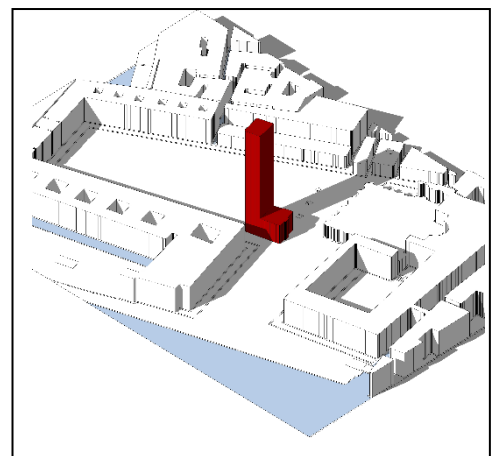
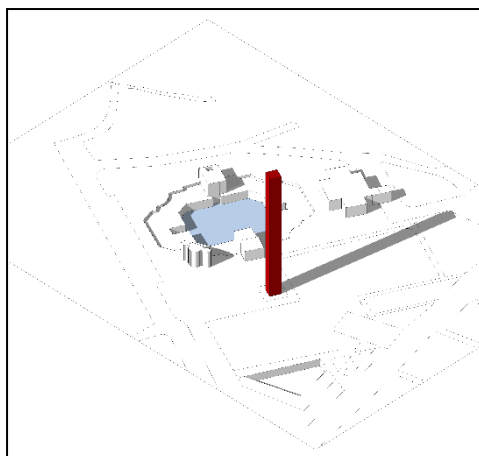
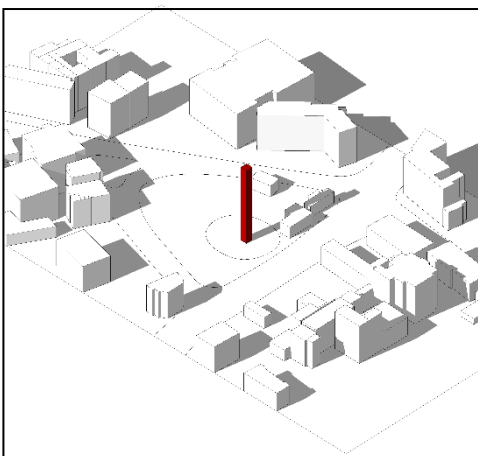
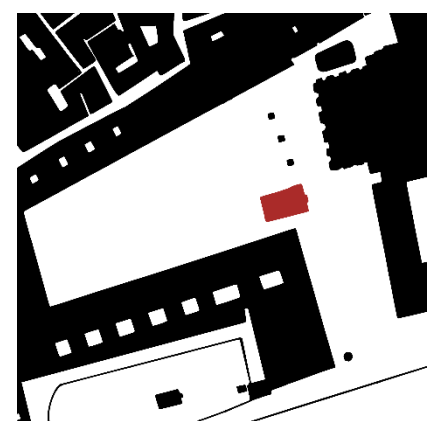
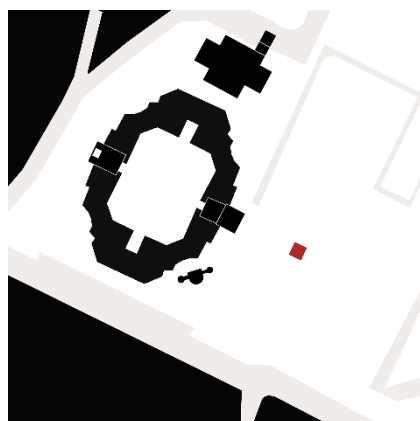
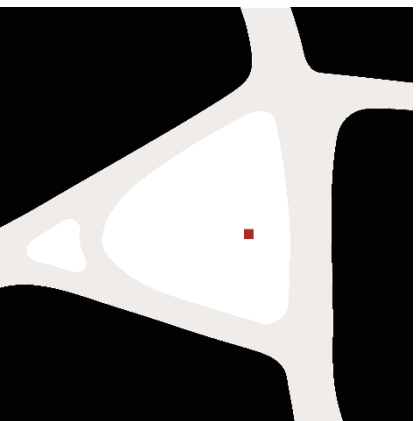
To provide a broad spectrum, a list of 15 Clock Towers across the globe have been compiled. It is categorized based on Urban form around the context of Clock Towers.

A matrix has been compiled with the following parameters as respective rows:

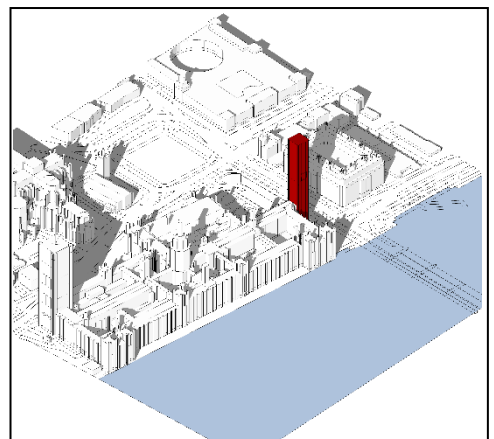
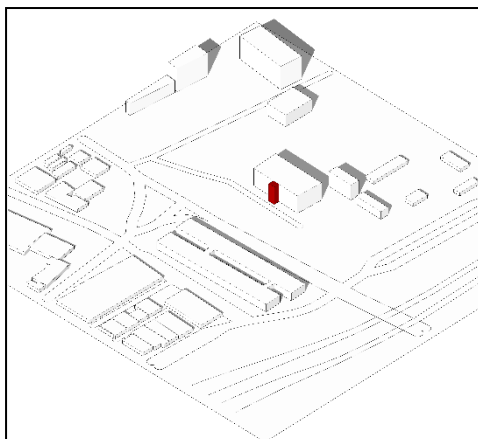
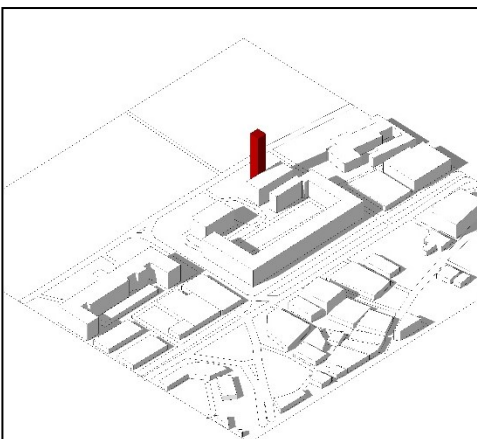
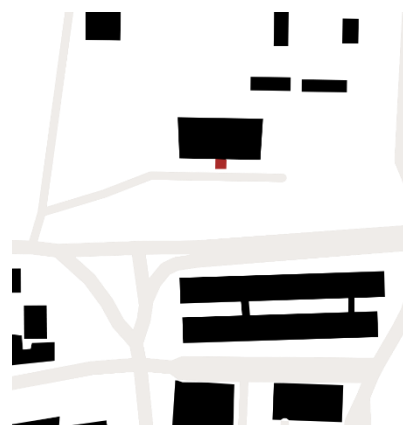
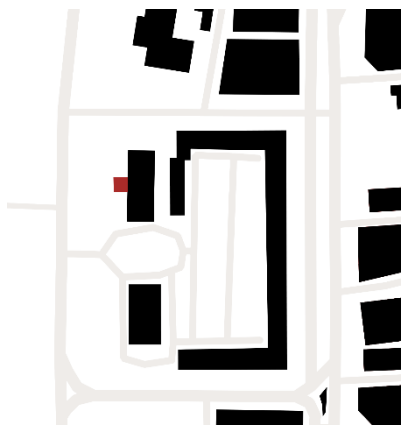
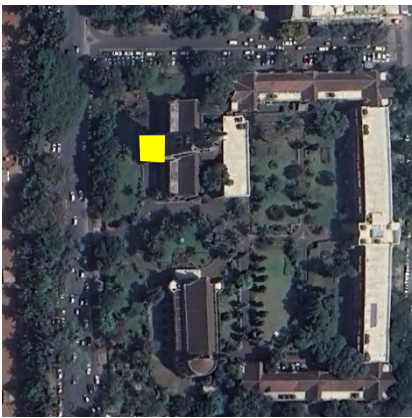
Examples include – 2 clock towers of Indian context and 1 from international context.

1. Photograph of Clock Tower in Urban Context
2. Satellite Image of Clock tower with its context.
 - **Photographs** and **Satellite Images** can reveal how well the clock towers are integrated into their urban contexts. For instance, towers surrounded by dense urban fabric versus those in open squares can show different levels of integration and accessibility.
 - The photographs can give insights into the architectural styles of the towers and their relation to surrounding buildings. This can lead to inferences about the historical periods they were built in and the evolution of urban morphology around these landmarks.
3. Figure Ground Plan.
 - The Figure Ground Plans highlight the **spatial hierarchy** and how the **built environment** is organized around the clock tower. Towers in densely built environments might serve as focal points in a chaotic urban fabric, whereas those in open spaces might emphasize the tower's prominence and visibility.
4. 3d Model :
 - 3D Models provide insights into the scale and proportion of the clock tower in relation to surrounding buildings. This can help in understanding how the height and bulk of the tower contribute to or contrast with the urban skyline.

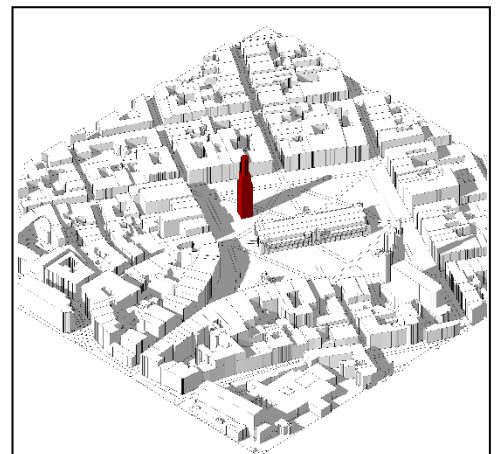
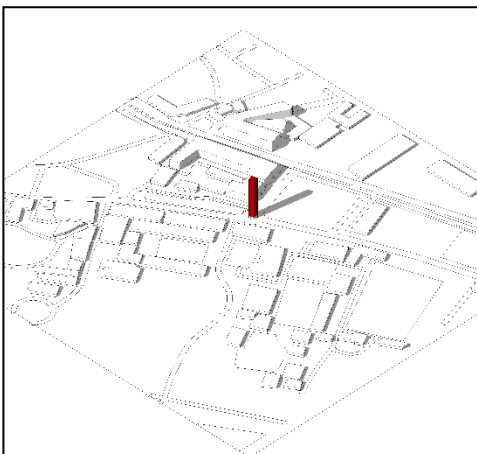
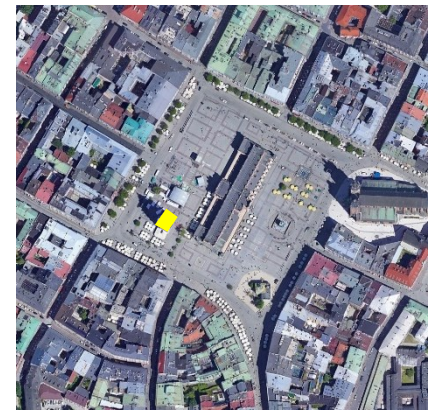
1. Clock Tower placed in a Maidan/ Parks/Gardens.



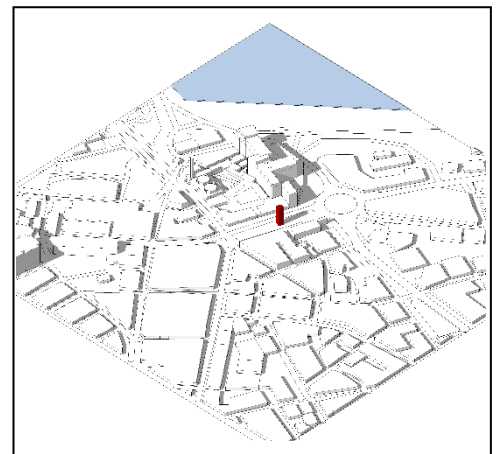
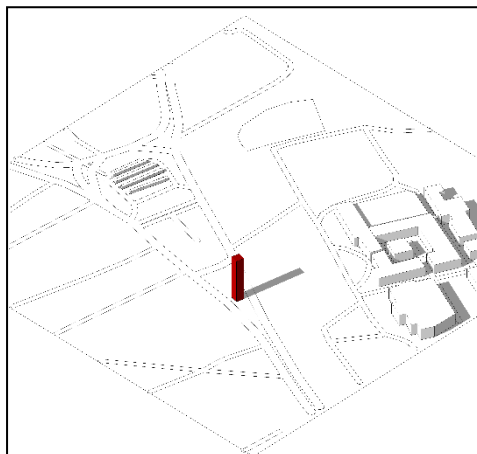
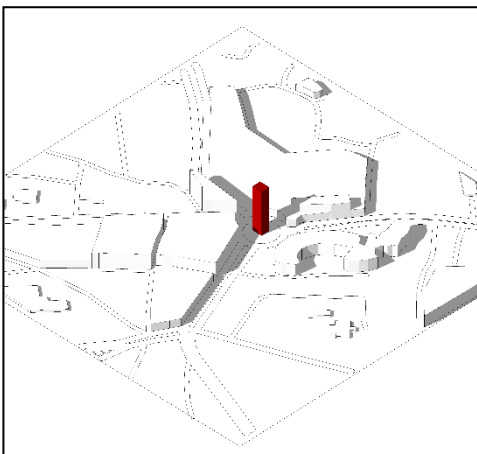
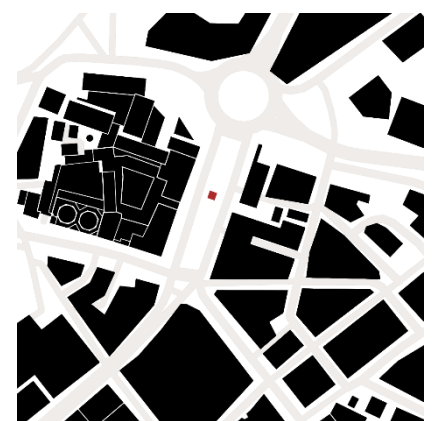
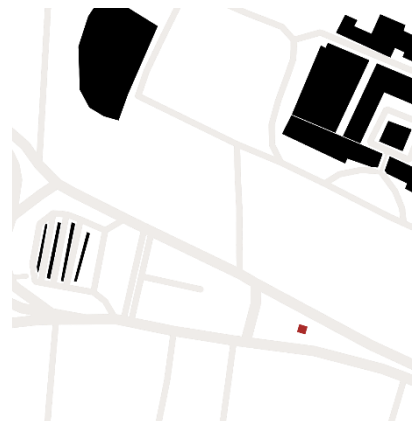
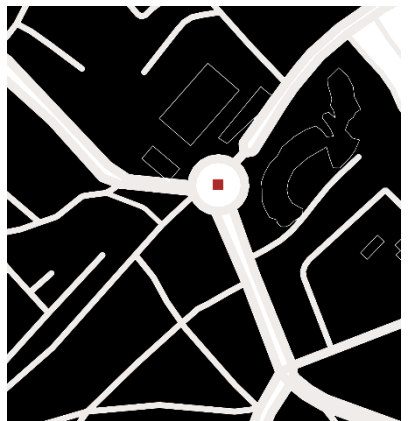
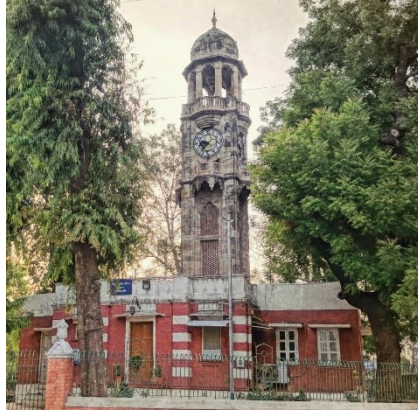
2. Clock Tower as a part of a Building



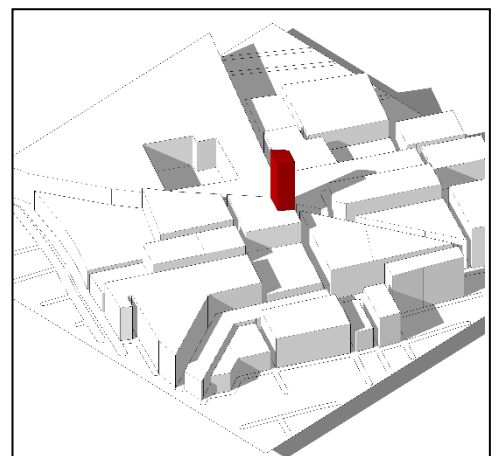
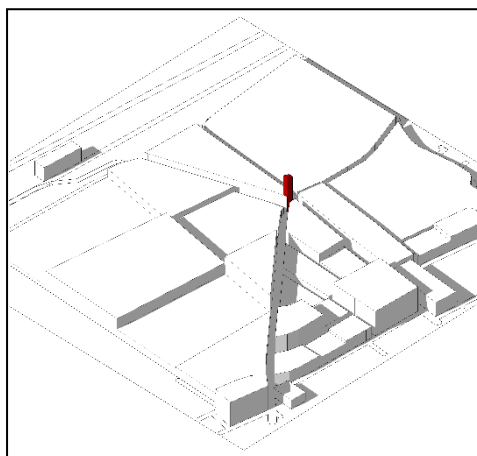
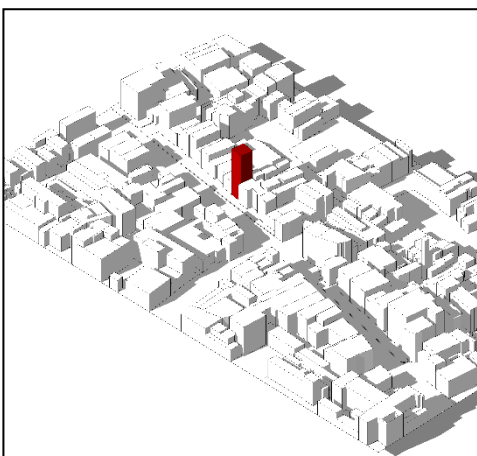
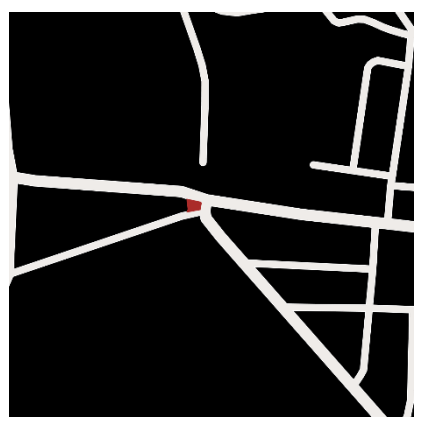
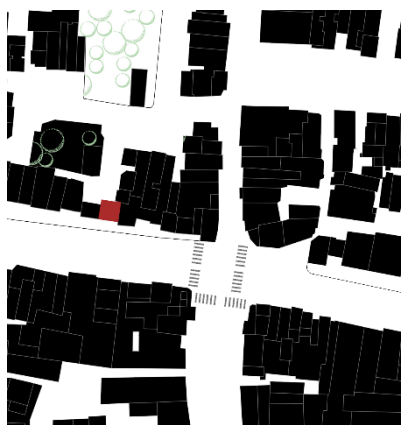
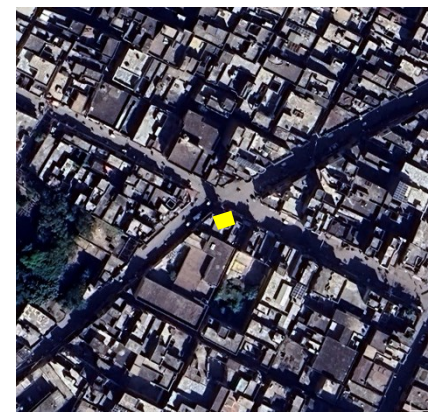
3. Clock Tower in center of Plazas/ Chawks:



4. Clock Tower as Part of a Crossroads/Islands:



5. Clock Tower as a part of a Street Edge.



4.2 Selection Of Case study

Clock Tower as a part of a Street Edge:

Old city precinct of Raopura, Vadodara



Figure 10. Selected Area of Study: Old city precinct of Raopura, Vadodara

Reasons for selecting:

- **Urban Context** - Vadodara: A major city in Gujarat known for its rich cultural heritage and a mix of historical and modern architecture. The transformation of the Raopura Tower demonstrates how a clock tower can integrate into a developing urban center.
- **Dynamic Market Typology:** An organically developed market with active street frontage on both sides of the main road.
- **Significant Urban Fabric Development:** Over the years, Raopura Tower has likely evolved from a central market area to a more mixed-use space, influencing its role in daily life and the urban identity of the city.
- **Clock Tower Placement:** Strategically integrated within the old city fabric, positioned in front of a crossroad.
- **Personal Experience:** As a researcher, I have witnessed the city's transition firsthand.

5. Case Study

4.2 Raopura Tower, Vadodara



Figure 11. Heritage Map of Vadodara (Source: VMC)

Location

Vadodara, formerly known as Baroda, boasts a history that spans centuries, characterized by a succession of rulers, cultural exchanges, and architectural marvels. One of the most significant chapters in Vadodara's history is the reign of the Gaekwads, a prominent Maratha dynasty that left an indelible mark on the city.

The Gaekwads rose to power in the late 18th century under the leadership of Damaji Rao Gaekwad, who established the princely state of Baroda. However, it was under the visionary rule of Maharaja Sayajirao Gaekwad III in the late 19th and early 20th centuries that Vadodara experienced its golden age. Sayajirao Gaekwad III was a progressive ruler who implemented numerous reforms, including in education, infrastructure, and administration, earning him the moniker "Maker of Modern Baroda."

During the Gaekwad era, Vadodara witnessed unprecedented growth and development. The city became a center of learning and culture, with institutions like the Maharaja Sayajirao University of Baroda and the Baroda College (now MS University) earning acclaim for their academic excellence.

The Gaekwads were also great patrons of the arts, attracting renowned artists, musicians, and scholars to the city.

Architecturally, Vadodara flourished under Gaekwad patronage. The Laxmi Vilas Palace, built in the Indo-Saracenic style, stands as a magnificent testament to their grandeur and opulence.

This sprawling palace, four times the size of Buckingham Palace, is adorned with intricate carvings, majestic domes, and sprawling gardens, reflecting the fusion of Indian and European architectural influences.

One of Vadodara's most recognizable landmarks is the Chimnabai Clock Tower, a majestic structure located in the heart of the city.

The Maharani Chimnabai Tower, commonly known as Raopura tower is one of the major landmarks of the city. Erected in 1896, the funds for the tower were contributed by the citizens of Baroda in the memory of Maharani Chimnabai I (1864-1885). Maharani Chimnabai I was the first wife of Maharaja Sayajirao Gaekwad III. It was inaugurated by the last Nawab of Baroda - Mir Kamaluddin Hussainkhan.

In the olden times, the clock used to play a melodious tune every 15 minutes and provided accessibility to time to all the four directions of the city. The tower was also a major stop for the horse-drawn trams, used as a mode of public transport in the city during the olden days.

The Tower:

Built in the Indo-Saracenic style, it is five storied structure that still dominates the skyline of the city. The lower levels house a narrow spiral staircase that leads to the upper levels. These lower levels along with the fourth level display exposed brick facade.

The lower three levels have cusped arched openings decorated with fine stucco work, on each side.

The fourth level features a huge clock fitted on all four sides of it. This level is demarcated by a narrow over hanging balcony with stone "Jali" parapet, supported on stone brackets. The last level is octagonal in shape and is plastered in a shade of yellow sandstone. This level is embellished with "jharokha" windows on four out of its eight side and is topped with a "shikhar"-like element with a finial on the top.

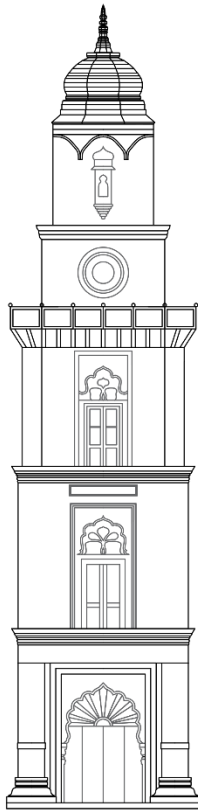


Figure 12. Elevation of Tower facing the street. (Source: Author)



Figure 13. Figure 12. Elevation of Tower facing the street. (Source: Author)

The clock:

The clock was brought from London by Maharaja and was installed in the tower in 1896. The dial of the clock measures a massive 6 feet with the minute hand being 3 feet in length. The chimes of that the clock that previously rang at every 15 minutes, now has been changed to ring at every hour.

It was recently restored by the authorities of the city. The tower looks it's best in the evenings when it is illuminated by strategic lights and still, after all these years manages to charm every passerby.



Figure 14. Clock (Source: Author)

6. Analysis

1. Physical Setting

A) Urban Fabric

i) Surrounding Context

The selected area of study is Urban form around the Raopura Clock tower. Approximately 300m x 150m of area is taken up. The Area is a part of the old city with majorly commercial and mixed used buildings facing the road.

The main accesses to the landmark are through Vehicular Road in front of it.

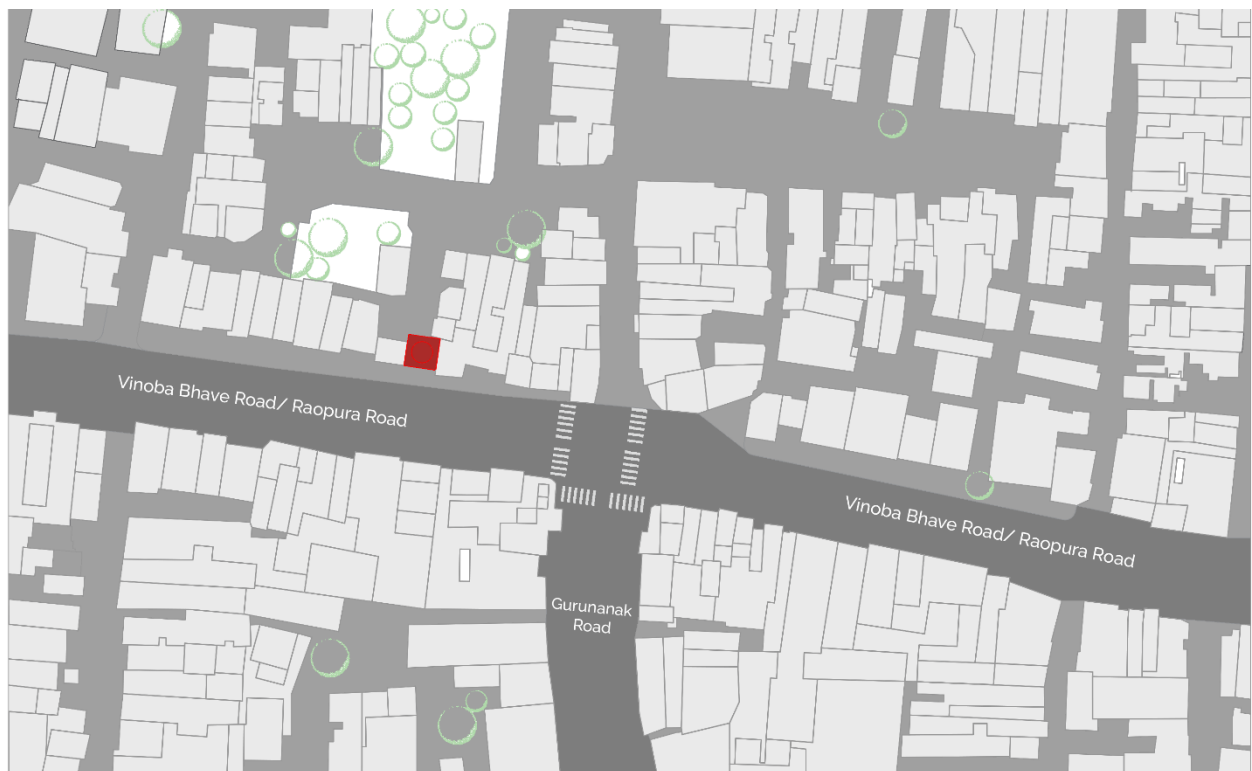


Figure 16. Selected Area of study (Source: Author)

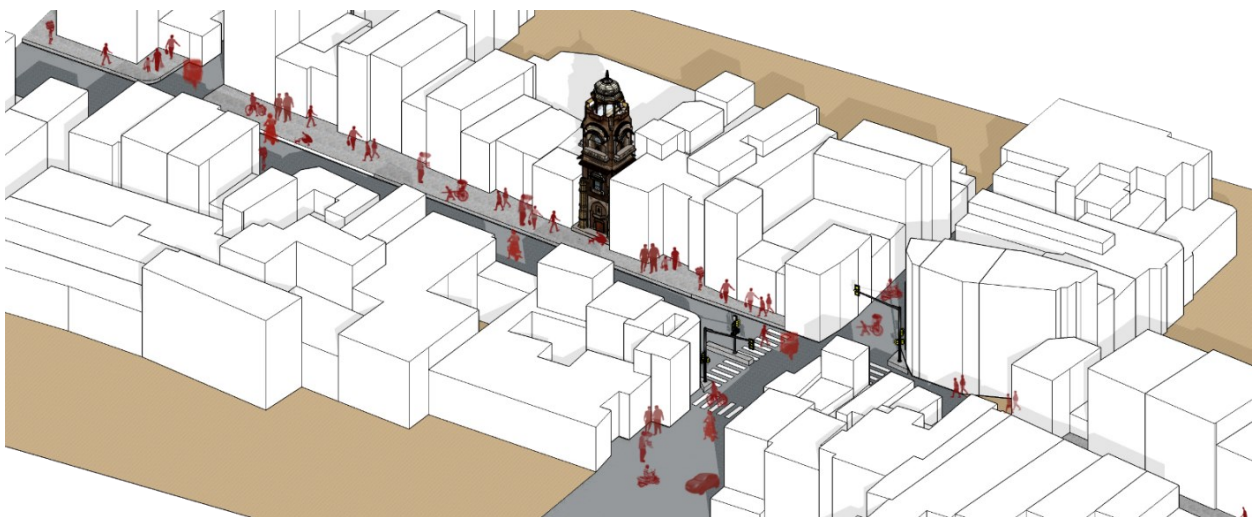


Figure 15. Activities around clock tower (Source: Author)

ii) Vistas of Landmark

Fig 18. shows A view of Chimnabai Clock tower from a terrace of a resident. The Landmark can be easily spotted from this point while there are still some new buildings equivalent to the scale of the tower.

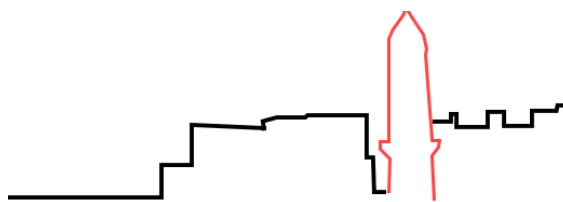
While in the second Photograph, the Clock tower cannot be spotted totally from just the next street at human eye level.



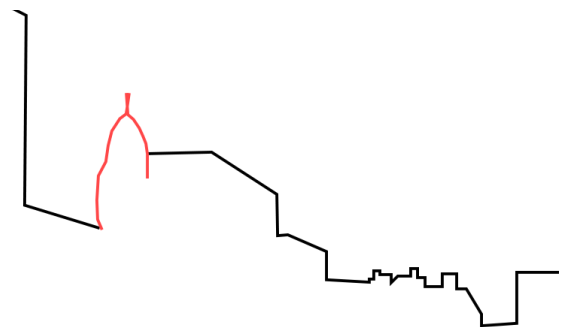
Figure 17. View from Terrace (Source: Author)



Figure 18. Ground level view from next street. (Source: Author)



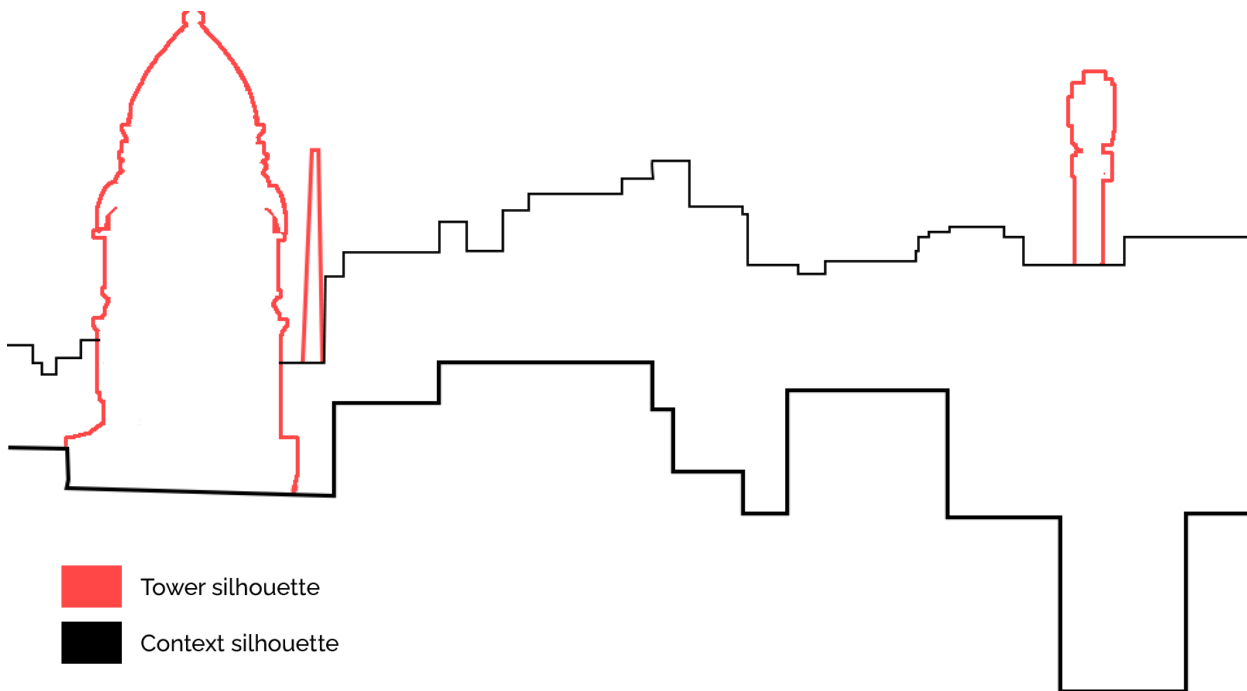
■ Tower silhouette
■ Context silhouette



The urban form silhouette emphasizes the distinct profile of the clock tower within the skyline, compared to other urban structures of similar scale and mass. While the clock tower is easily identifiable, its clock is not visible from a distance of approximately 150 meters and thus does not effectively display the time. Consequently, as shown in Figure 17, it primarily serves as a landmark for navigation and orientation within the urban space.



Figure 19. (Source: Times of India)



The urban form silhouette showcases the unique profiles of various towers against the skyline, emphasizing the contrast between modern towers and clock towers in terms of architectural style and construction era.

iii) Spatial perception

A visibility map of the clock tower has been created, illustrating the tower's visibility from various points marked on the plan. This map provides a comprehensive analysis of sightlines, showing from which locations within the urban environment the clock tower can be seen. By examining this map, one can understand the visual prominence and accessibility of the clock tower from different vantage points, highlighting key areas where the tower serves as a landmark and identifying potential visual obstructions in the urban landscape.



Figure 20. (Source :Author)



B) Built Form

i) Figure- Ground Map



The open spaces consist of main roads and a residential enclosure, which become primary areas for spillover activities. The dense residential fabric includes small pockets for these activities. Access to the residential cluster is provided by streets, while commercial shops are accessed via the main road.



Figure 21. Open space for commercial spillover (Source: Author)



Figure 22. Open space for residential spillover (Source: Author)

ii) Building Typology



The commercial market extends along both sides of Raopura Road, with buildings lining the road primarily being mixed-use or commercial. Over the years, the number of these buildings has steadily increased, reflecting the area's growing commercial activity.

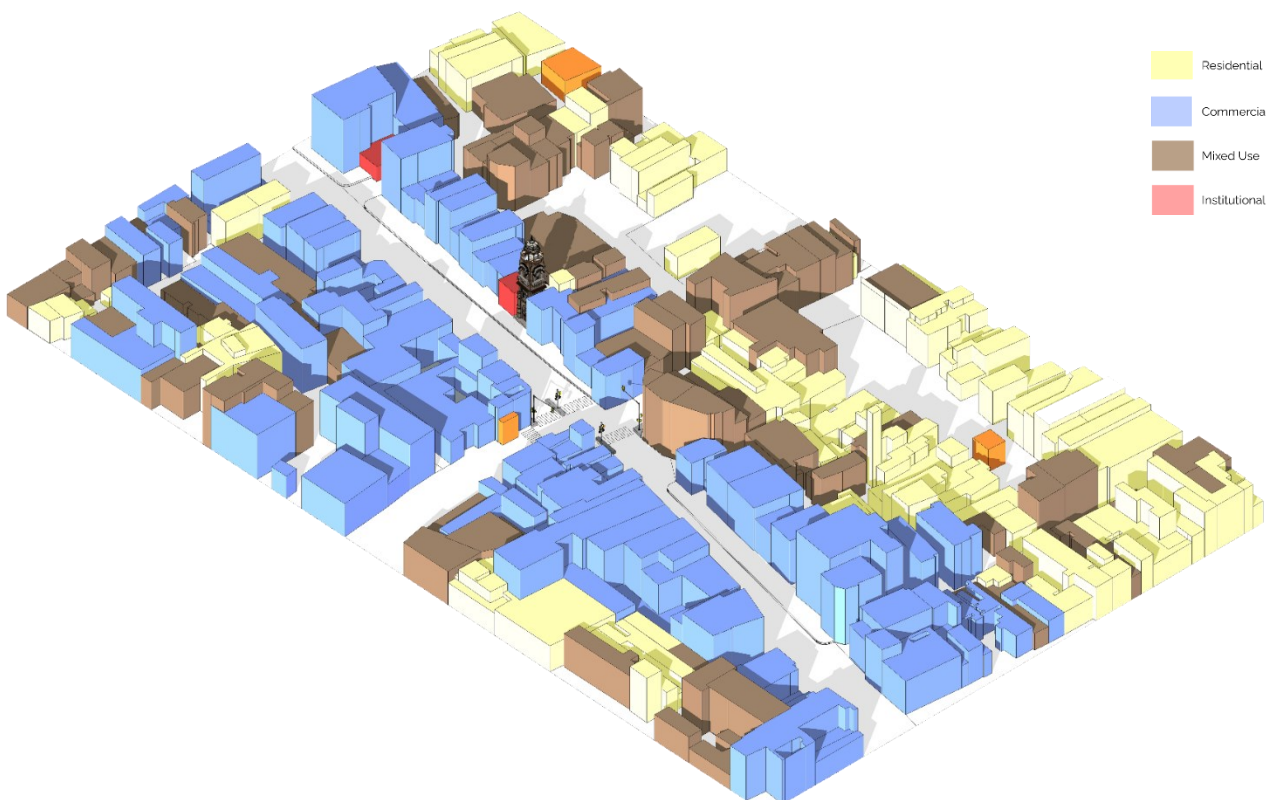


Figure 23. 3d Model showcasing building typology of area of study (Source: Author)

Transformation of the Urban form over the years:



Figure 24. Raopura tower in 1890s

Raopura Tower in 1890s:

The Tower was installed in between a civic building, which served as a main point for pick of Tram service.

The buildings in immediate context went up to 2 floors.



Figure 25. Raopura tower in 1950s (Source: Author)

Raopura Tower in 1950s:

The development of a commercial street can be seen.

The buildings in immediate context went up to 3 floors.



Figure 26. Raopura Tower in 2024 (Source: Author)

Raopura Tower in 2024:

Extensive development of commercial buildings.

The buildings in immediate context went up to 5 floors.

C) Streets

i) Street Network/ Accessibility



Figure 27. Hierarchy of access (Source: Author)

Raopura Road serves as the main vehicular artery, directing traffic towards Sam Circle, a significant urban junction. Running perpendicular to Raopura Road is Gurunanak Road, which further extends to Dandia Bazar Char Rasta, another key intersection within the city. These primary roads form the backbone of the area's transportation network, facilitating major vehicular movement and connecting important urban nodes.

In contrast, the secondary roads branch off from these main roads, providing access to smaller streets nestled within the densely built residential areas. These secondary roads are crucial for local traffic, offering routes into the more intimate and tightly knit neighborhoods. They support the daily flow of residents and facilitate access to homes and local amenities, integrating the residential fabric with the broader urban infrastructure. The layout of these secondary roads ensures connectivity and accessibility while maintaining the character and scale of the residential enclaves.

Street Analysis

A section of street which encompasses the clock tower is analyzed.

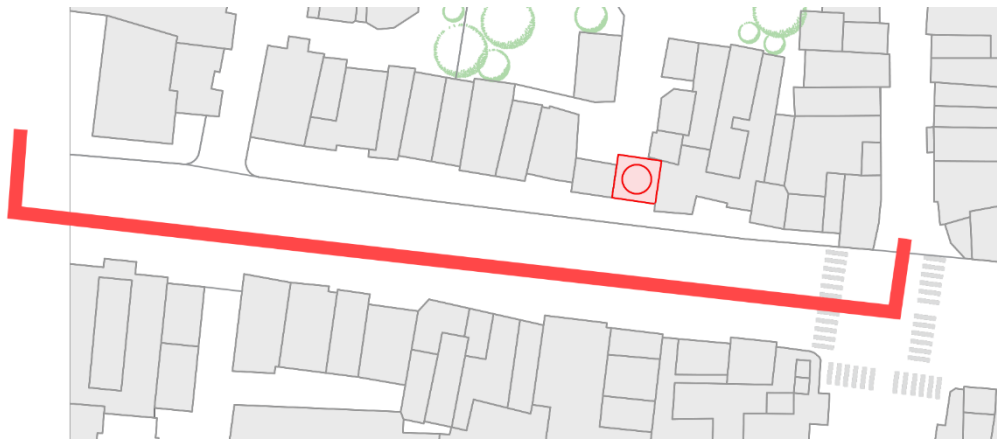


Figure 28. Plan indicating street (Source: Author)



Figure 29. Elevation of the Street. (Source: Author)

The elevation analysis reveals that the clock tower blends somewhat with the surrounding urban fabric due to the presence of buildings of similar height and scale. However, what sets it apart is its distinctive architectural style and the materials used in its construction. The clock tower is the only building constructed with exposed brick, while the other buildings have plain facades adorned with commercial hoardings.

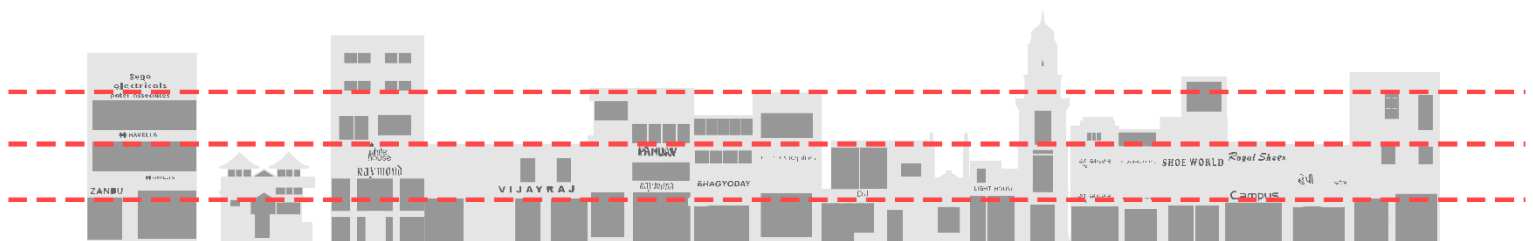


Figure 30. Levels of Street (Source: Author)

The heights of the urban forms are mostly up to three levels. However, some buildings are nearly the same height as the Raopura Clock Tower.

Mass and Void diagram of Facade

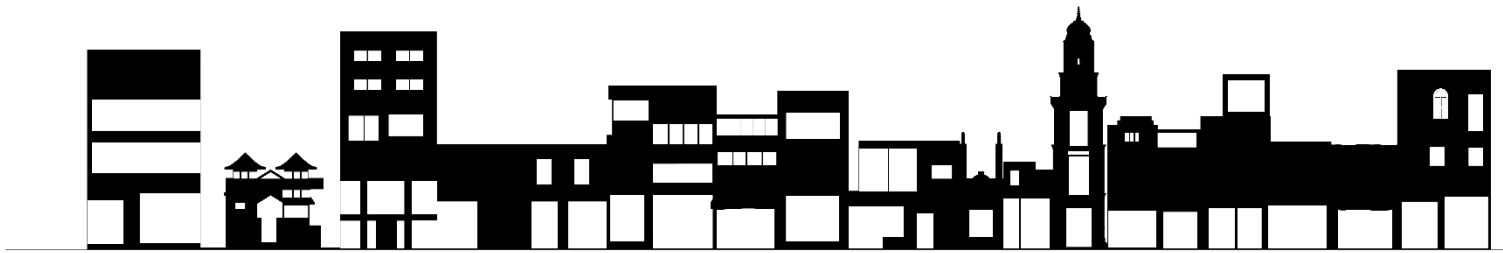


Figure 32. Mass and Void of facade (Source: Author)

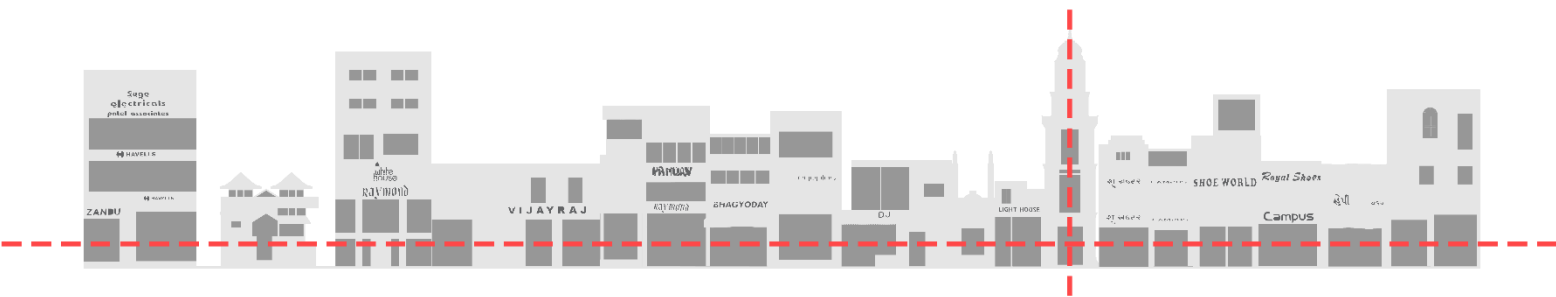


Figure 31. Placement of Openings (Source: Author)

The openings of commercial and mixed-use buildings are primarily on the ground floor, consisting mostly of shop shutters. In contrast, the clock tower features vertical openings on each level, enhancing its sense of visual verticality compared to the surrounding buildings. This vertical alignment of windows and openings on the clock tower not only distinguishes it architecturally but also contributes to its prominence in the urban landscape, drawing the eye upward and emphasizing its stature amidst the horizontal lines of the neighboring structures.

Commercial buildings have glass facades which provide visual porosity in the environment.

The residential buildings feature balconies or terraces as extended openings. These provide private outdoor spaces for residents and enhance the visual connectivity of the residents to the streets.

Building Typology:

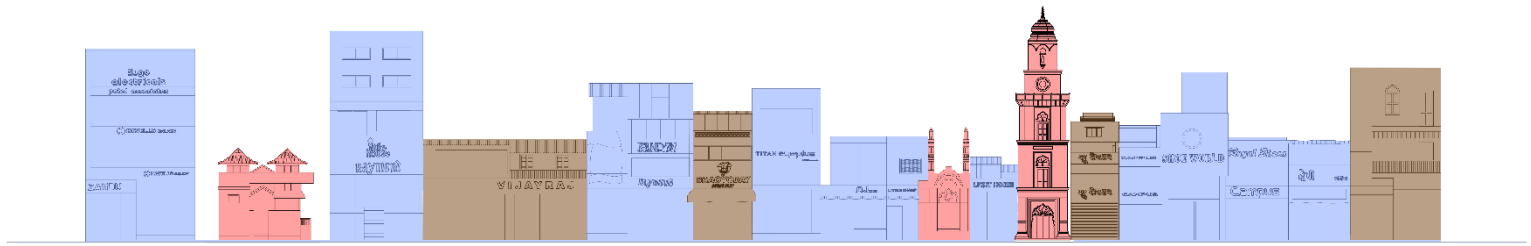


Figure 33. Building Typology of Street. (Source: Author)

The clock tower is located near a mosque, which draws people to the area, enhancing the clock tower's prominence as a local landmark. To the far left of the clock tower is the Shivpura Police Station. This police station acts as a buffer zone, providing open space and facilitating access to the residential area through two parallel streets on either side. The proximity of the mosque and the police station not only increases foot traffic around the clock tower but also integrates it into the daily activities of the community, making it a central point in the urban fabric. The open space around the police station helps to balance the density of the residential area, offering a breather that improves connectivity and flow within the neighborhood.

Typology 1: Commercial buildings-

The facade of these structures typically boasts plain exteriors adorned with commercial hoardings, serving as prominent advertising platforms. The architectural design prioritizes functionality and accessibility, with the ground floor serving as the main point of interaction with customers and pedestrians. While the facade lacks intricate detailing, it maintains a practical



Figure 34. Commercial shop beside the tower (Source: Author)

and utilitarian aesthetic, emphasizing visibility and ease of access for commercial operations

Typology 2: Mixed Use buildings:

These buildings typically boast a multi-level structure, with the ground floor accommodating commercial spaces characterized by prominent openings such as shop fronts and entrances. Above, residential units are integrated seamlessly into the building's composition, often featuring windows and balconies that provide

natural light and outdoor access for residents.

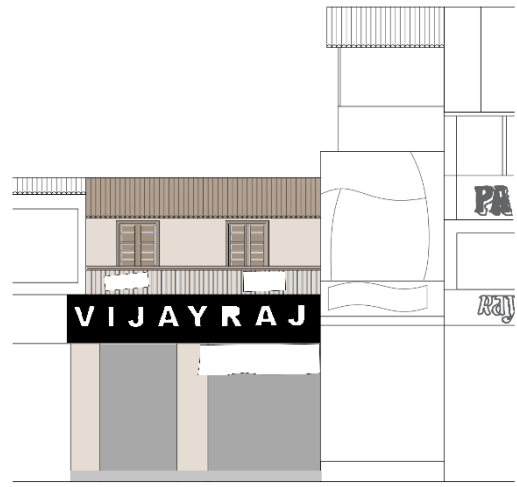


Figure 35. Mixed Use building in the street (Source: Author)

ii) Facades

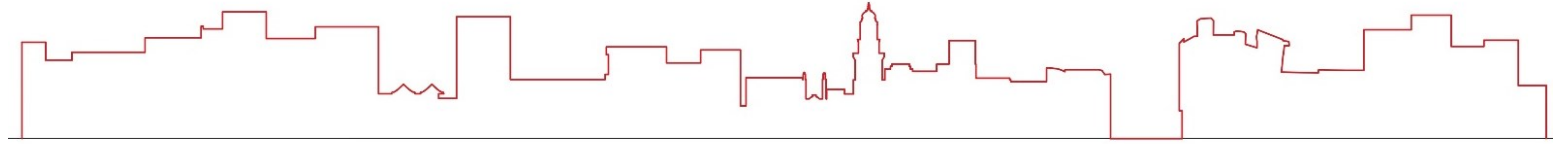
Street Elevation of the road



Figure 36. Area denoting Elevation of the Street in plan (Source: Author)



Figure 37. Elevation of the whole street. (Source: Author)



The skyline, derived from the elevation of the entire street, reveals a distinctive silhouette for the tower. Unlike the other buildings, which have bland and flat facades, the tower stands out with its intricate and detailed facade. This intricate outline is highlighted against the simpler, more uniform profiles of the surrounding structures, making the tower a prominent feature in the skyline.

Façade of The Tower:

The tower is constructed in the Indo-Saracenic architectural style, which is characterized by several distinctive elements.

Notable features include the onion-shaped (bulbous) dome that crowns the structure, providing a prominent and visually striking silhouette. The facade also showcases chhajjas—overhanging eaves supported by conspicuous brackets—which serve both decorative and practical purposes by providing shade and protection from the elements.

Additionally, the architecture incorporates pointed arches and scalloped arches, adding to the tower's intricate and ornate appearance. These highlighted elements on the facade exemplify the fusion of Indian and Saracenic (Islamic) architectural traditions, contributing to the tower's unique aesthetic and historical significance. The interplay of these features not only enhances the visual appeal but also underscores the cultural and architectural heritage embedded within the tower's design.

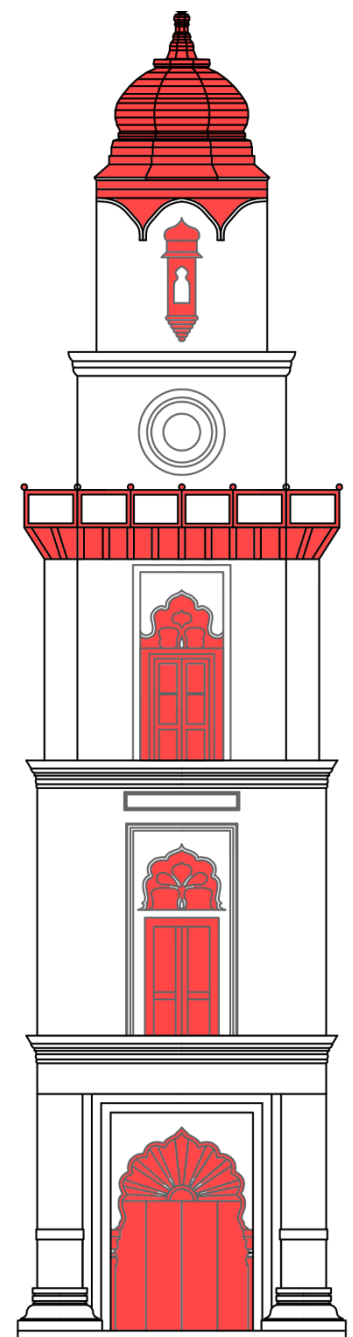


Figure 38. Elevation of Raopura Clock tower (Source: Author)

Material palette:

The Materials used are Brick, concrete and wood for door window frames and detailing.

Brick is a fundamental material, providing both structural support and a distinctive visual texture.

Concrete bands are used to provide structural stability to the structure.

Wood is utilized primarily for door and window frames, as well as for detailed architectural elements. It provides a natural warmth and contrast to the brick and concrete, enhancing the aesthetic appeal of the buildings.

While steel is used to make intricate railings.



Indo-Saracenic architecture, which emerged during the British colonial period, is characterized by a blend of Indian and Islamic architectural elements with Victorian Gothic revival and neoclassical styles. Vadodara, as a princely state under the Gaekwads, embraced this architectural style, leading to the creation of several iconic buildings.

The Indo-Saracenic architecture of Vadodara is not just about aesthetic appeal; it reflects the city's cosmopolitan history and the cultural synthesis that occurred during the colonial period. It represents a period of economic prosperity and cultural renaissance under the Gaekwad rule, who were patrons of the arts and architecture.

iii) Nodes

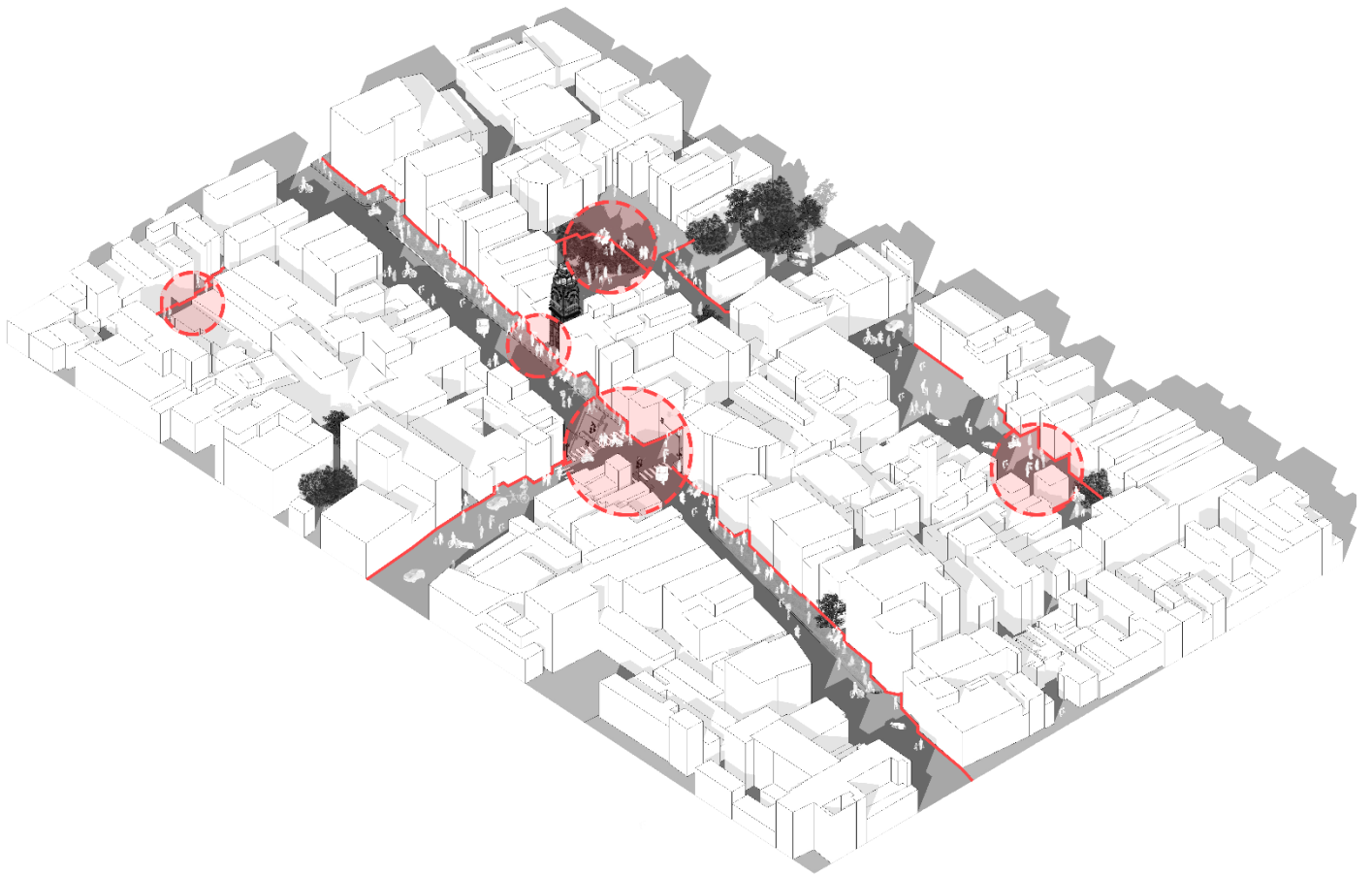


Figure 41. Nodes of activity highlighted (Source: Author)

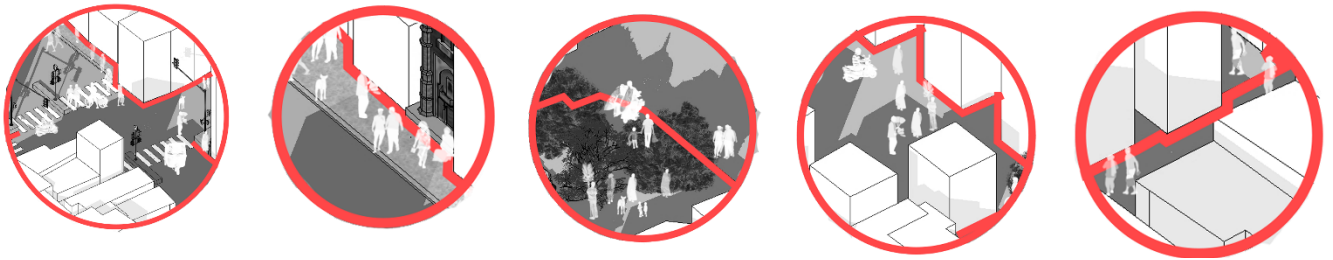


Figure 39. Informal selling on the plinth of the clock tower (Source: Author)



Figure 40. Extended selling in front of residential buffer, the police chowki. (Source: Author)



Figure 43.. Activity in the crossroad junction (Source: Author)



Figure 42. Extended selling in front of commercial buildings (Source: Author)

The commercial edge of the shops extends informally onto the plinths and even spills onto the streets, shaping the unique character of the street.

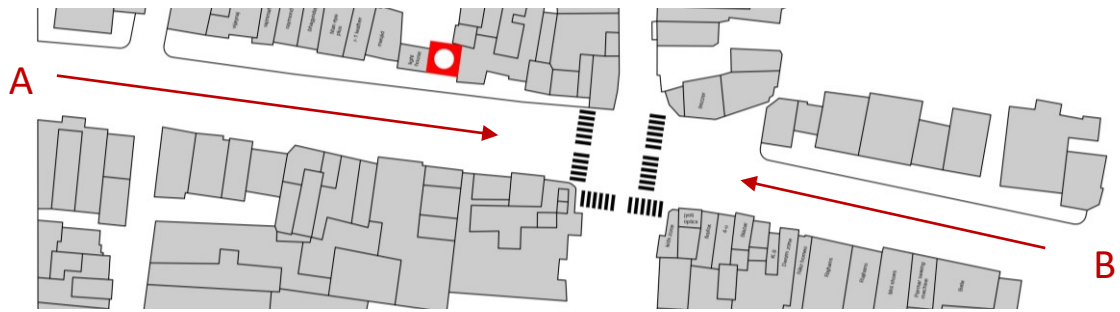
This phenomenon results in heightened public interactions that progressively intensify as the day unfolds.

The nodes of activity within the area can be classified into several categories, each contributing to the vibrancy of the community. These include residential nodes where daily activities of residents take place, commercial nodes where business transactions thrive, bustling crossroad junctions that serve as hubs of movement and exchange, the central temple area surrounded by residential open spaces which fosters social gatherings and religious activities, and the vicinity of the tea shop, a popular spot for locals to socialize and unwind.

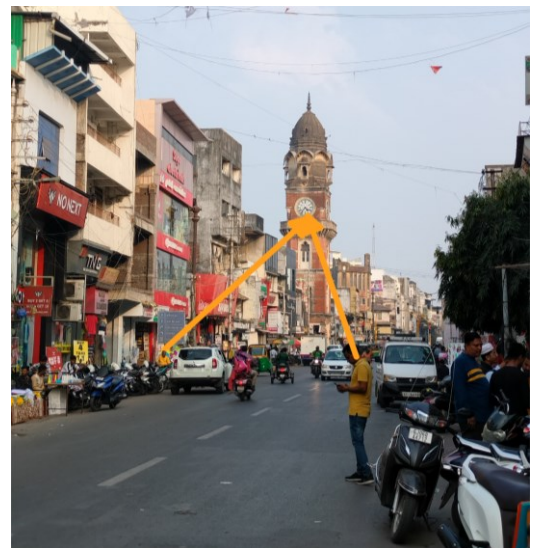
This intricate network of activity nodes adds layers of dynamism to the urban fabric of Raopura, reflecting the diverse and interconnected aspects of daily life in the community.

D) Scale

Visual connectivity of people on the crossroads with the clock tower



A)



B)

E) Landmarks



2. Activity

Jan Gehl (1996: 11-13) categorizes outdoor activities in public spaces into three distinct types: necessary activities, optional activities, and social activities.

Necessary activities: These are obligatory tasks that people must engage in to varying degrees. They typically include daily chores and errands, such as walking to school, shopping, or waiting at a subway station. Since these activities are essential, external conditions have minimal influence on their occurrence, and they can happen throughout the year under almost any conditions. For example, a salesman must go to work regardless of the weather.

Optional activities: Unlike necessary activities, optional activities only occur when individuals are willing to participate and when external conditions are favorable. Examples include taking a leisurely walk, enjoying the scenery, or sunbathing. These activities rely heavily on suitable external conditions, and people are drawn to engage in them when the weather and environment are pleasant.

Social activities: Social activities depend on the participation of others in public spaces. This category encompasses a wide range of interactions, including children playing, conversations, and passive social contacts where individuals perceive others through sight and sound. Social activities often occur spontaneously when people engage in necessary or optional activities in shared spaces. While the physical environment does not directly influence the quality or intensity of social activities, urban planners and architects can create conducive environments that support social interaction by enhancing the conditions for necessary and optional activities, thereby facilitating opportunities for people to meet and engage with one another.

	Quality of the physical environment	
	Poor	Good
Necessary activities	●	●
Optional activities	●	●
Social activities	●	●

Figure (Gehl, 1996: 16) can explain the relationship between quality of outdoor space and occurrence of outdoor activities. When exterior environment offers favorable conditions, the number of optional activities will increase

Furthermore, due to the increase of optional activities, the frequency of social activities will rise steadily. We can see that these three kinds of activities are usually linked with each other rather than being independent. People's outdoor public lives are not only walking, greeting, recreational and social activities, but also the whole series of all the activities. This combination makes the public space of cities more attractive and vibrant.

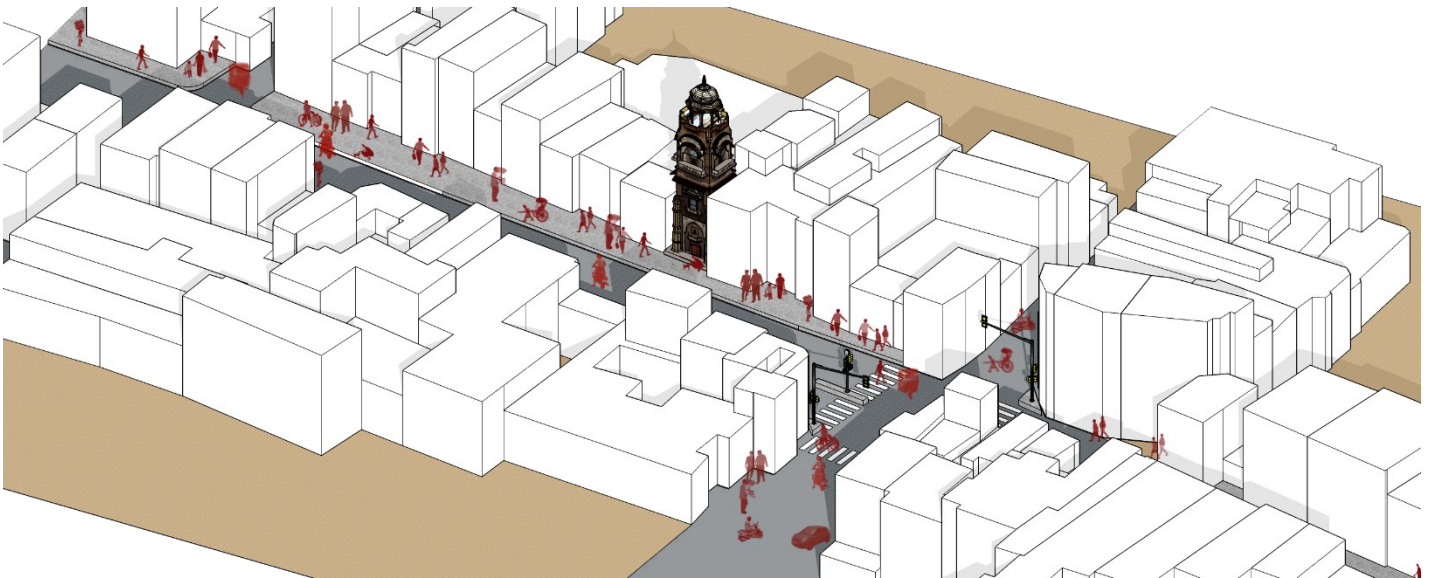


Figure 45. Usual Activities highlighted in the space. (Source: Author)

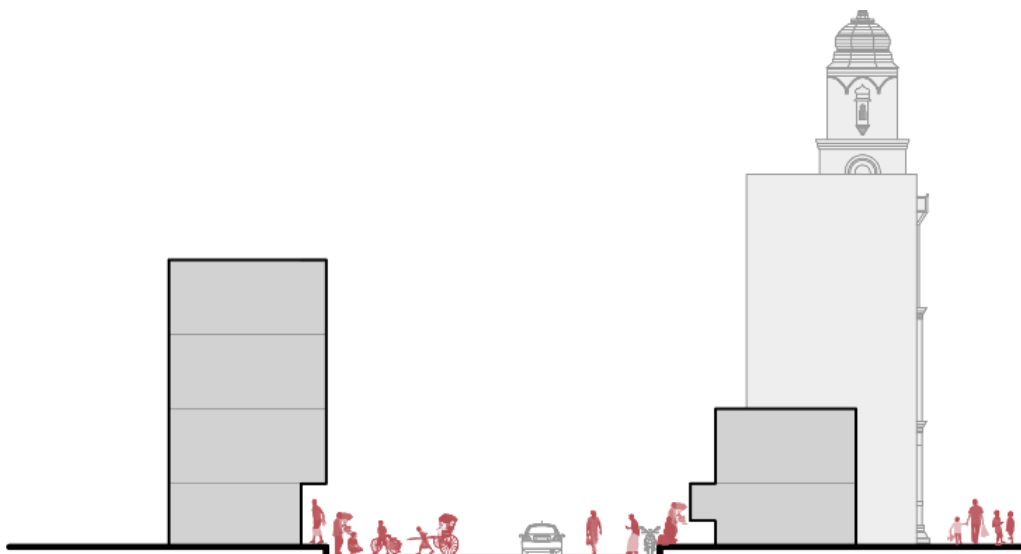


Figure 44. Section showing activities (Source: Author)

Activity Mapping



Figure 46. Activities during morning time (Source: Author)



Figure 47. Activities during evening (Source: Author)



Activity mapping of the Raopura area unveils distinct patterns during morning and evening, observed through the lens of different gender groups and the activities of children. In the morning, men predominantly engage in commercial activities, bustling through the market streets, attending to shops, and commuting to work.

Women are often spotted managing domestic tasks like shopping for groceries, visiting the local temple, and dropping children off at school. Meanwhile, children are seen rushing to school, accompanied by parents or older siblings, adding to the morning bustle with their laughter and chatter.

As evening descends, men continue their commercial pursuits but with a more relaxed pace, often seen socializing with friends over tea at local stalls or indulging in recreational activities at nearby parks.

Women's activities tend to pivot towards family and community, with gatherings in neighborhood spaces, attending religious events, or participating in community meetings.

Children, now free from school, fill the streets with their playful energy, engaging in games with friends or accompanying their parents on errands, contributing to the vibrant atmosphere of Raopura's evening hours.

These varied activities paint a holistic picture of the community's daily rhythm, showcasing the interconnectedness of gender roles, family dynamics, and the youthful spirit that enlivens the streets of Raopura.

3. Meanings

After gathering public perceptions and opinions about the clock tower, I have thoroughly evaluated the responses using the following parameters:

A) Legibility
B) Symbolism
C) Memory
D) Sensory Experience
E) Knowledgeability

Legibility: Assessing how easily the clock tower can be identified and recognized within the urban landscape. This includes its visibility, distinctiveness, and ease of orientation it provides to the people in the area.

Symbolism: Evaluating the symbolic meaning of the clock tower as perceived by the public. This involves understanding what the clock tower represents to the community, such as a historical icon, a cultural emblem, or a landmark of significance.

Memory: Investigating the personal and collective memories associated with the clock tower. This includes exploring the extent to which the clock tower is remembered and valued in the personal histories of individuals and the community's shared experiences.

Sensory Experience: Examining the sensory experiences evoked by the clock tower, including visual appeal, sounds, and the overall ambiance of the surrounding area. This parameter considers how the clock tower influences the sensory perception of the urban environment.

Knowledgeability: Understanding the level of knowledge and awareness the public

has about the clock tower's history, architectural style, and cultural significance. This involves evaluating how informed people are about the clock tower's background and its role in the city's heritage.

By analyzing these parameters, I have derived a comprehensive understanding of the public's perception of the clock tower, providing valuable insights into its significance and role within the urban fabric of Raopura.

Conclusion:

The morphological analysis conducted in this research illustrates how the physical presence of Clock Towers influences the surrounding urban fabric, shaping spatial perception and creating visual anchors within the cityscape. Changes in the morphology of these areas directly impact public perception, with alterations to the built environment affecting the legibility, symbolism, and sensory experiences associated with the Clock Tower.

Surveys and interviews with residents indicate a notable discrepancy in the perceived relevance of Clock Towers between older age groups and the present population. It is evident that for older individuals, the Clock Tower holds a considerably higher significance compared to contemporary perceptions. This variance can be attributed to the evolution of urban fabric over time, which has introduced challenges such as reduced accessibility and hindered visibility of the Clock Tower.

The development of urban areas often entails the proliferation of buildings, infrastructure, and urban features that may obstruct sightlines to historical landmarks like the Clock Tower. This obstruction can diminish the prominence of the Clock Tower in the urban landscape, particularly for younger generations who may not have grown up with the same level of exposure or attachment to these iconic structures.

Furthermore, as urban spaces undergo transformations to accommodate modern needs and functions, the traditional roles and symbolic meanings associated with Clock Towers may diminish in relevance. Older individuals, who may have experienced a different urban environment characterized by greater visual prominence and accessibility to the Clock Tower, are likely to retain a stronger sense of attachment and significance towards it.

Furthermore, the study highlights the role of Clock Towers in enhancing the vitality of street life and promoting social interactions among city dwellers. Whether serving as meeting points, orientation markers, or venues for public gatherings, these structures play a vital role in shaping the urban experience and fostering a sense of belonging among residents.



The survey findings regarding the perceived relevance of Clock Towers, particularly among different age groups, provide valuable insights into the complex interplay between urban identity, architectural heritage, and evolving urban fabric.

Urban identity, the collective sense of belonging and attachment to a city, is deeply intertwined with its architectural landmarks. Clock Towers, with their historical significance and symbolic value, play a crucial role in shaping this identity. However, as urban areas undergo development and transformation, the visibility and accessibility of these landmarks can be compromised, impacting their perceived importance among different segments of the population.

The disparity observed in the survey results highlights a generational shift in the appreciation and significance of Clock Towers within the urban landscape. Older age groups, who may have experienced a cityscape characterized by greater prominence and accessibility to these landmarks, exhibit a stronger attachment and sense of relevance towards them. In contrast, younger generations, influenced by changes in urban fabric and lifestyle preferences, may perceive Clock Towers as less integral to their urban experience.

Way Forward

This dynamic underscores the importance of preserving and integrating architectural heritage into contemporary urban planning practices. Maintaining the visibility and accessibility of Clock Towers not only preserves their historical and cultural significance but also reinforces a sense of continuity and connection with the past. By acknowledging and accommodating the diverse perspectives and experiences of different age groups, urban planners can ensure that these landmarks continue to serve as meaningful symbols of urban identity for present and future generations.

In conclusion, the relationship between Clock Towers, urban identity, and evolving urban fabric is multifaceted. Recognizing the role of these landmarks in shaping collective memory, fostering social cohesion, and defining the character of urban spaces is essential for maintaining a vibrant and inclusive urban identity. Efforts to preserve, enhance, and celebrate Clock Towers as integral components of the urban landscape are vital for sustaining a sense of place and belonging within rapidly changing cities.

Survey form

Sample of questionnaire survey form

1. Name
2. Age
3. Gender
4. Occupation
5. Education background
6. Time spent in Vadodara 5 years or less
7. Where do you live?
8. Where do you work?
9. Why are you here?
10. What are the major landmarks of this area?
11. How familiar are you with Raopura?
12. How familiar are you with Raopura Tower ?
13. Do you feel a sense of belonging here in Raopura tower?
14. Do you come to Raopura for important services and activities? (police station, bus stand, post office, hospital, metro station, etc)
15. Do you have any strong memories attached to Raopura Tower?
16. Do you like living/coming at Raopura?
17. Do you feel connected to your community in Raopura ?
18. Do you feel safe living/coming at Raopura Tower?
19. Do you think Raopura Tower is famous in any way?
20. What comes to your mind hearing the Raopura tower?
21. How often do you look at the clock in the Tower?
22. Do you notice the tower everytime you come in this area?
23. How would you describe the tower to a new person in the city?
24. What do you think is the symbol of Raopura?
25. Do you know any history behind this tower?
26. Do you think the tower is important for you?

27. How is Raopura different from other areas?

28. What do you like/dislike most about Raopura?

29. Do you think Raopura has changed? If yes then Why?

Survey Answers

- **Name:** Meena Patel
- **Age:** 54
- **Gender:** Female
- **Occupation:** Housewife
- **Education Background:** High School Graduate
- **Time Spent in Vadodara:** More than 30 years
- **Where do you live?:** I live in the residential area near Raopura.
- **Where do you work?:** As a housewife, my work is primarily at home, taking care of my family.
- **Why are you here?:** I've lived here since my marriage, and this is where my family is settled.
- **What are the major landmarks of this area?:** Some major landmarks include the Raopura Tower, the nearby mosque, Shivpura Police Station, and the local market.
- **How familiar are you with Raopura?:** I am very familiar with Raopura; it's a part of my daily life.
- **How familiar are you with Raopura Tower?:** I am quite familiar with Raopura Tower as it is a prominent landmark in the area.
- **Do you feel a sense of belonging here in Raopura Tower?:** I feel a general sense of belonging in Raopura, including the tower area.
- **Do you come to Raopura for important services and activities?:** Yes, we frequently visit the area for services like the police station, post office, and the market.
- **Do you have any strong memories attached to Raopura Tower?:** I don't have any particularly strong memories attached to the tower, but it's always been a part of our neighborhood.
- **Do you like living/coming at Raopura?:** Yes, I enjoy living here. It's a vibrant area with everything we need close by.
- **Do you feel connected to your community in Raopura?:** Yes, I feel a strong connection with the community. We know our neighbors well and support each other.
- **Do you feel safe living/coming at Raopura Tower?:** Generally, yes. The area is usually bustling with people, which makes it feel safe.

- **Do you think Raopura Tower is famous in any way?:** Yes, it's well-known as a historical and cultural landmark in Vadodara.
- **What comes to your mind hearing the Raopura Tower?:** The clock, the bustling market, and the history of the area.
- **How often do you look at the clock in the Tower?:** I glance at it almost every day when I am out, especially if I am passing by or in the market.
- **Do you notice the tower every time you come in this area?:** Yes, it's hard to miss, and it's a key feature of the skyline.
- **How would you describe the tower to a new person in the city?:** It's a beautiful, historical clock tower, right in the heart of Raopura, and a must-see landmark.
- **What do you think is the symbol of Raopura?:** The Raopura Tower itself is a significant symbol of this area.
- **Do you know any history behind this tower?:** No
- **Do you think the tower is important for you?:** Yes, it's important as a historical symbol and a central part of our daily life.
- **How is Raopura different from other areas?:** Raopura has a unique blend of historical charm and modern hustle. It's very lively and culturally rich compared to other more modern areas.
- **What do you like/dislike most about Raopura?:** I like the vibrant market and the sense of community. I dislike the traffic congestion at times.
- **Do you think Raopura has changed? If yes then Why?:** Yes, Raopura has changed with more commercial development and increased traffic, but it still retains its historical essence.

• **Name:** Rahul Sharma

- **Age:** 14
- **Gender:** Male
- **Occupation:** Student
- **Education Background:** Currently in 9th grade
- **Time Spent in Vadodara:** All my life, 14 years
- **Where do you live?:** I live in a residential area nearby.
- **Where do you work?:** I go to school and also attend tuition classes near Raopura.
- **Why are you here?:** I come here for my tuition classes and sometimes for shopping with my parents.
- **What are the major landmarks of this area?:** The Raopura Tower, the mosque, and the local market are some major landmarks.
- **How familiar are you with Raopura?:** I am quite familiar with Raopura since I come here often for classes.
- **How familiar are you with Raopura Tower?:** I know about the Raopura Tower, but it doesn't hold much significance for me.
- **Do you feel a sense of belonging here in Raopura Tower?:** Not really, I don't feel a strong sense of belonging to the tower.
- **Do you come to Raopura for important services and activities?:** Yes, sometimes for shopping and occasionally for other services like the bus stand.
- **Do you have any strong memories attached to Raopura Tower?:** No, I don't have any strong memories attached to Raopura Tower.
- **Do you like living/coming to Raopura?:** It's okay, I come here mainly for my tuition classes.
- **Do you feel connected to your community in Raopura?:** Not particularly, my friends and activities are mostly outside of Raopura.
- **Do you feel safe living/coming to Raopura Tower?:** Yes, it's generally safe, but I don't spend much time around the tower.
- **Do you think Raopura Tower is famous in any way?:** Yes, it's known as a historical landmark, but it doesn't seem very relevant now.
- **What comes to your mind hearing the Raopura Tower?:** I think of it as an old clock tower that

is part of the area's history.

- **How often do you look at the clock in the Tower?:** I don't really pay much attention to the clock.
- **Do you notice the tower every time you come in this area?:** Yes, I see it, but it's not something I focus on.
- **How would you describe the tower to a new person in the city?:** It's an old clock tower built in a historical style, but now it's just part of the background.
- **What do you think is the symbol of Raopura?:** The market and the busy streets seem more like the symbol of Raopura to me.
- **Do you know any history behind this tower?:** Yes, I've heard it was built during the British era, but I don't know many details.
- **Do you think the tower is important for you?:** No, it's not important for me personally.
- **How is Raopura different from other areas?:** Raopura is busier and has more old buildings compared to other areas.
- **What do you like/dislike most about Raopura?:** I like the market for shopping, but I dislike the traffic and noise.
- **Do you think Raopura has changed? If yes then Why?:** Yes, it has changed with more shops and people, but the tower's relevance seems to have faded.

- **Name:** Raju Tripathi

- **Age:** 35
- **Gender:** Male
- **Occupation:** Auto Rickshaw Driver
- **Education Background:** Completed 10th grade
- **Time Spent in Vadodara:** 20 years
- **Where do you live?:** I live in the Karelibaug area.
- **Where do you work?:** I drive my auto rickshaw all around the city, but I often find myself in Raopura.
- **Why are you here?:** Raopura is a busy area with lots of passengers looking for a ride.
- **What are the major landmarks of this area?:** The Raopura Tower, the bustling market, and the mosque.
- **How familiar are you with Raopura?:** Very familiar. I know the roads and shortcuts like the back of my hand.
- **How familiar are you with Raopura Tower?:** I know it well. It's an old clock tower, a landmark in this area.
- **Do you feel a sense of belonging here in Raopura Tower?:** Not really. I'm here for work, not because I have any personal connection to the tower.
- **Do you come to Raopura for important services and activities?:** Occasionally, I come here for services like the post office or to pick up passengers from the bus stand.
- **Do you have any strong memories attached to Raopura Tower?:** No, it's just a part of my daily route. Nothing special to me.
- **Do you like living/coming to Raopura?:** It's a good spot for work, but I prefer the quieter streets of Karelibaug where I live.
- **Do you feel connected to your community in Raopura?:** My community is more in Karelibaug. In Raopura, I'm just passing through for work.
- **Do you feel safe living/coming to Raopura Tower?:** Yes, it's generally safe, but it's too crowded for my liking.
- **Do you think Raopura Tower is famous in any way?:** It's famous as a historical landmark, but it doesn't seem very relevant now.

- **What comes to your mind hearing the Raopura Tower?:** The hustle and bustle of the market and the constant traffic.
- **How often do you look at the clock in the Tower?:** Rarely. I'm more focused on the road and my passengers.
- **Do you notice the tower every time you come in this area?:** Yes, it's hard to miss, but it's just another part of the scenery to me.
- **How would you describe the tower to a new person in the city?:** It's an old, historical clock tower that stands in the heart of Raopura. A good landmark if you're finding your way around.
- **What do you think is the symbol of Raopura?:** The lively market and the constant activity on the streets.
- **Do you know any history behind this tower?:** I've heard it was built during the British times in an Indo-Saracenic style, but that's about it.
- **Do you think the tower is important for you?:** No, it's not important for me personally. Just a part of the landscape I navigate through.
- **How is Raopura different from other areas?:** Raopura is always buzzing with people and activity. It's much busier and more chaotic compared to other parts of Vadodara.
- **What do you like/dislike most about Raopura?:** I like the number of passengers I can find here, but I dislike the constant noise and traffic jams.
- **Do you think Raopura has changed? If yes then Why?:** Yes, it has become more crowded and commercial over the years, but the charm of the old market and the Raopura Tower still remains.

Montgomery, J. (1998). Making a City: Urbanity, Vitality and Urban Design. *Journal of Urban Design*.

Relph, E. (1976). *Place and Placelessness*.

<https://iopscience.iop.org/article/10.1088/1757-899X/245/4/042031>

https://en.wikipedia.org/wiki/Clock_tower

<https://cloudnola.eu/>

https://www.researchgate.net/publication/338107933_Public_spaces_in_historic_sites_as_a_Tool_of_raising_cultural_awareness

<https://dergipark.org.tr/tr/download/article-file/50731>

<https://www.quora.com/Why-have-the-clock-towers-Ghanta-Ghar-in-cities-now-lost-their-relevance>

[https://www.academia.edu/5454118/Historical_Perspective_of_Clock_Towers_of_Pakistan Establishment of Clock Tower Gujranwala](https://www.academia.edu/5454118/Historical_Perspective_of_Clock_Towers_of_Pakistan_Establishment_of_Clock_Tower_Gujranwala)